Engineering

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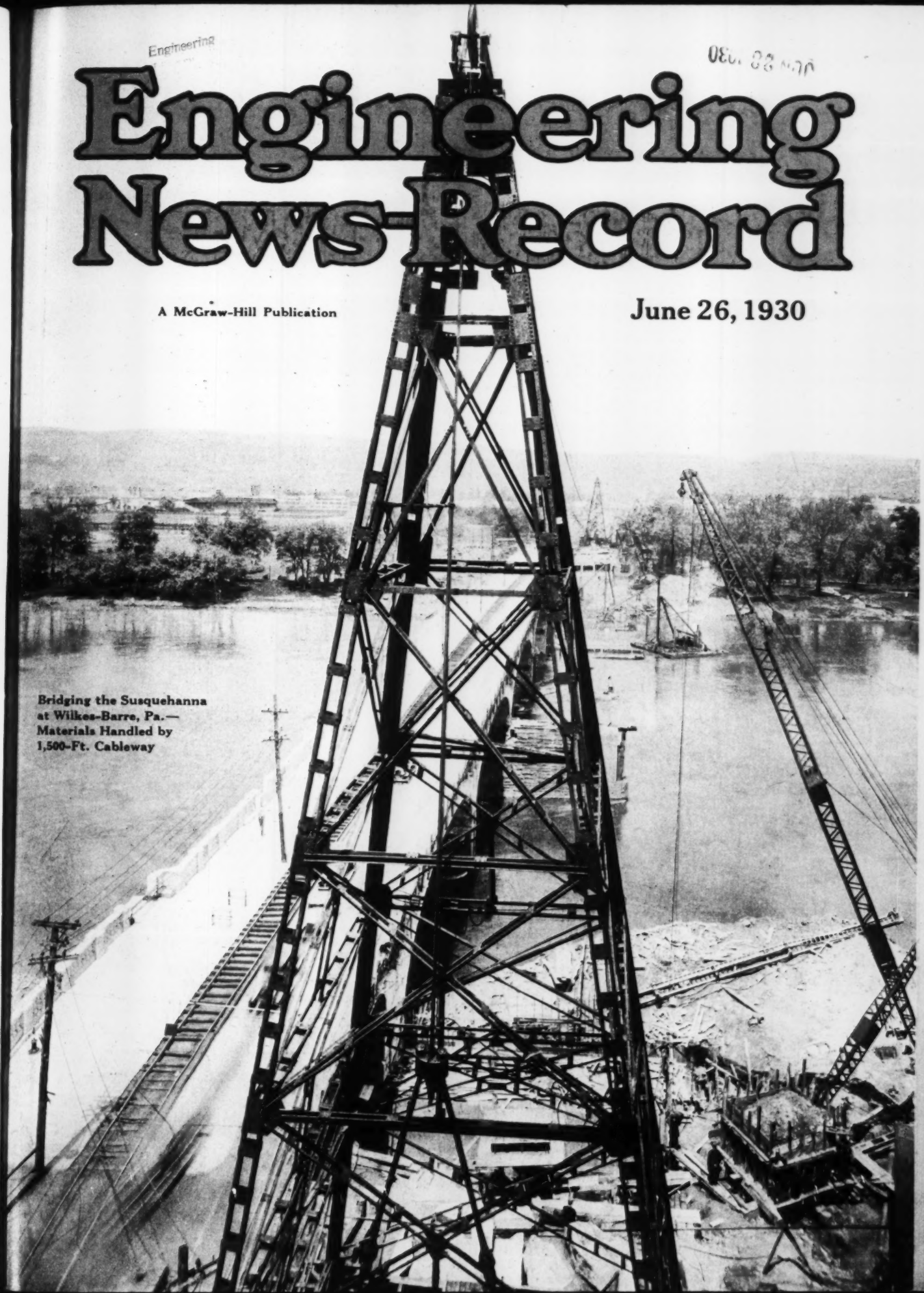
Engineering News-Record

A McGraw-Hill Publication

June 26, 1930



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CABLE ADDRESS: "MACHINIST, N. Y."

Published weekly. $5 per year. 25 cents per copy. Entered as second-class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Member A.B.C.
Member A.B.P.

NUMBER OF COPIES PRINTED THIS ISSUE, 31,765

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WASHINGTON, National Press Building
CHICAGO, 520 N. Michigan Avenue
PHILADELPHIA, 1600 Arch Street
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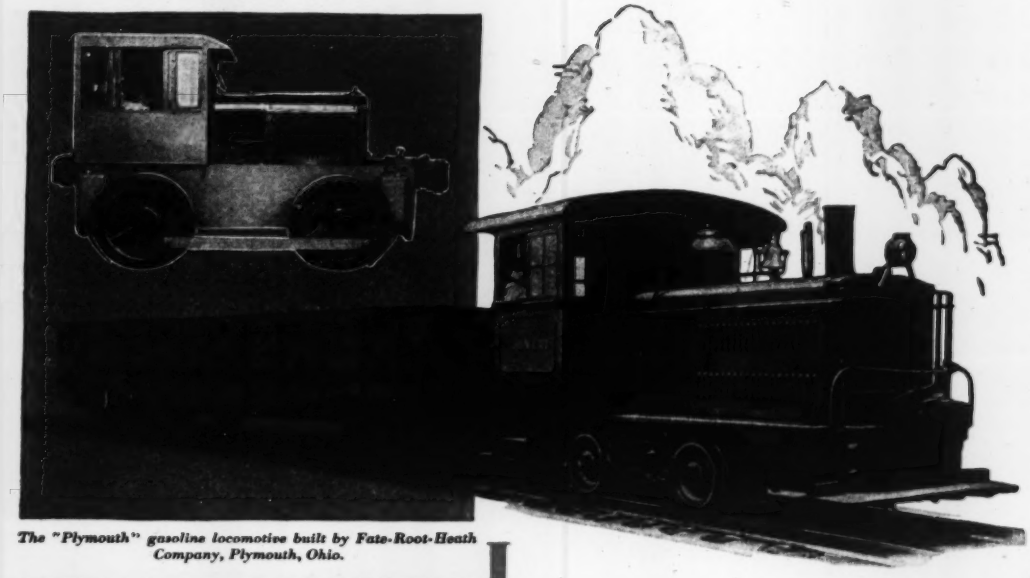

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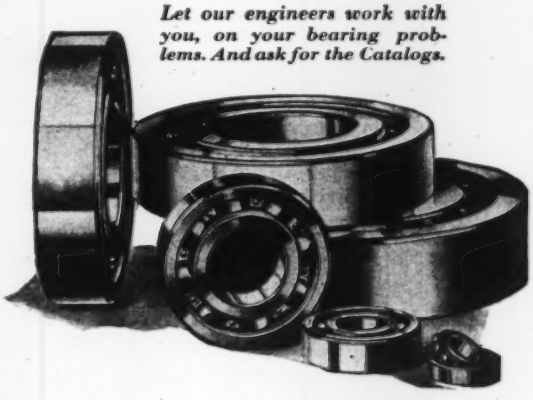

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ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION — ESTABLISHED 1874

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 104 NEW YORK, JUNE 26, 1930 Number 2

Power Discussion

PUBLICITY is altogether constructive, we hold. Even publicity for erroneous views is useful, since it offers the quickest course to their correction. This belief is fairly general, and therein lies the explanation of the extraordinarily wide mention given last week to reports that at the World Power Congress in Berlin an American utility leader attempted to have the American ambassador change his proposed address on the ground of alleged erroneous statements about power cost. No one subject has risen so rapidly in the scale of public interest during recent years as power, in all aspects connected with its public availability and cost, and for this reason its open discussion is bound to lead to progress—even if, as above suggested, some of the discussion should involve error. Dicussion and wide understanding of the costs of both generation and distribution are the surest preparation for right disposition of controversial questions on power control.

A Construction Need

WHILE the recovery of general business from last autumn's sudden depression still lags unseasonably, engineering construction activities in most departments maintains fair pace, though well below that required by the construction budgets set up last winter as indicated by our telegraphic survey in November. But housing—and for that matter all building—is at a low ebb, as it was last year, in spite of the fact that the supply of banking and commercial money is much more free and interest rates much lower than they were in 1929. Men in close contact with building operations say that they expect the second half of the year to show greater activity in large commercial building, while no one is similarly optimistic about residential work. Neither of the two fields enjoys the same credit facilities as mercantile business, though commercial building is closer to the general money market than is residential building. If money or credit were made available to these fields as readily as to industry and commerce, they would probably show a sharp improvement. Creation of an organized financial system to supply credit to the building industry is, in fact, the greatest need of the present banking structure. It should not be beyond the powers of men who are ready to build up credit systems of thousands of millions on the basis of railway and utility properties.

Doing their Bit

LAST winter, when President Hoover called upon the leaders of large industries to aid in getting the country back to normal by speeding up construction programs, the railroads stated that they expected to spend as much money as last year and that they would increase the amounts to be spent during the first part of the new year over what they had expected to spend. They have more than lived up to their promise. Figures compiled by the American Railway Association for the first three months of the year show an expenditure of $223,700,000, nearly $12,000,000 in excess of original estimates and $96,600,000 over expenditures for a corresponding period last year. This was done in the face of a serious reduction in net income on the part of many roads. Better evidence of the fundamental soundness of American industry and of the business acumen of its leaders would be hard to find.

River Cutoffs

ANALYSES of the phenomena of cutoffs are rare in the published records of our alluvial rivers. This alone lends interest to the article in this issue which enumerates the characteristics of notable local rectification of channel made by the Missouri in the half century that it has been under some measure of engineering observation. The article has in addition a definite value in stating circumstantially and with a measure of precision how, where and why cutoffs take place. No attempt is made to discuss cutoff effects on river regimen or to speculate upon their adoption as artificial means of channel improvements. Both are enticing problems in the practical hydraulics of stream control and flood protection, and they merit a consideration that has not been given them, at least in published records of the economic development and regulation of the Mississippi, Missouri, Red and other rivers of the great alluvial valley of the middle United States. As a factual survey of cutoff phenomena and of their causes and mode of action, the survey of the Missouri can be repeated with advantage for the other valley streams. It is to be hoped that others of the government engineers may be fired with ambition to imitate Engineer F. Y. Parker of the Kansas City office. He has given the profession facts and conclusions relating to a phenomenon of alluvial rivers about which it had little easily available information.

Old Buildings

UNEXPLAINED up to the present, the total collapse of an old warehouse building in New York City last week may prove to add nothing to present knowledge of building safety, because of the completeness of the destruction. Overloading and deterioration are the most obvious causes of structural failure after long service, but these usually give advance warning long before the final disaster, and no information yet uncovered points to them as responsible in the present case. It is interesting to recall that an earlier case of building collapse in the same city, eight or ten years ago, also showed no evidence of weakening by these agencies, but in that case a quite new explanation was advanced by the city superintendent of buildings, R. P. Miller. He reached the conclusion

that the unanchored floor joists had pulled out of the brick walls progressively in the course of time, perhaps as the cumulative effect of traffic vibrations. No other instances have arisen to support the theory that a building might be endangered in this way; perhaps naturally, since joist anchorage is nearly always used, as an essential of good construction. But the theory is none the less valuable, for it lays stress on the undoubted fact that recent changes in city conditions may have a bearing on views of stability. It is known that heavy street traffic operating at high speeds often produces perceptible tremor in many buildings, for instance, and it is not impossible that severe tremor of this kind may bring about displacement of structural parts. Such possibilities are good reason for caution in the supervision of old buildings. Any change of load or other service conditions ought to be made only after thorough structural examination. In addition every building should, after reaching a certain age depending on its type, undergo an inspection full enough to reveal any changes and form a basis for an estimate of its strength.

Standardization Gains Support

FOR nearly ten years the broad range of technical standard making as represented in the work of the American Standards Association has been under the hampering disadvantage of poverty. Attempting to do two or three dollars' worth of work on one dollar of income could not be satisfactory; and it was not, as witnessed by various complaints and grumblings. Now the association is able to announce that it has obtained the financial support of some fifteen corporations and industrial associations, in such proportions as to bring its income up to an adequate figure. This result is the outcome of a systematic educational campaign, required to make the relatively young movement properly understood by industrial chiefs. That they now recognize in hard cash the value of prudently directed standardization is gratifying testimony to the progressiveness of industry. It also assures that there will be no likelihood of harmful persistence of outworn standards through slowness in revising them when conditions change. The new financing is in all respects constructive; it is likely to mean active growth and perfection of current standardizing methods.

Scour at Dams

DECADES have gone by since scour below dams was first seen to be a major problem of hydraulic engineering. It remains as interesting and important as ever. Destroying the energy of a large volume of falling water harmlessly is something that may well tax the engineer's imagination and ingenuity, for flood spill often represents more power than the usable generating capacity of the stream. These facts are obvious; yet in spite of them one can find many a dam with smoothly curving overfall leading out to an apron which, at considerable construction cost, preserves the energy of the discharge water and allows it to work sure destruction as soon as it touches the natural channel bed. Numerous interesting experimental studies of efficient energy-destroying means have been carried out in this country during the past fifteen years. In Europe, development has followed an individual course, with methods and results which we hope to be able to present in the near future. In the meantime, emergency flood conditions at the Calderwood dam have produced a demonstration of flood scour possibilities that is highly instructive. One of the leading methods of energy destruction, use of a cushion pool, was incorporated in the Calderwood design, but unseasonable water conditions brought a large flood spill before the pool could be completed. However sensible the loss to the owners of the dam, it ought to return a good part of its cost to the country at large by focusing attention more insistently on the significance of the problem involved in the destructive energies of overfall water.

A Never-Ending Task

ALL observation of conditions in the field of sewage treatment re-emphasize the fact that building a treatment plant, no matter how good, does not assure satisfactory sewage disposal but merely provides a means for it. The remaining task, the decisive one and one which never ends, is competent operation of the works. This fact is recognized by most engineers but is often misunderstood or ignored by public officials. It is again brought to notice by R. E. Koon, consulting engineer, of Portland, as a result of observations indicating that lack of proper operation and general neglect have resulted in unsatisfactory conditions in 21 of the 23 existing sewage-works in Oregon. The fact that the two others maintaining proper operating practices are eminently successful in results obtained indicates that the answer to the difficulty in some of the other cases is not obscure. Here lies a large problem in public education. The providers of money for sewage-treatment projects, and particularly the administrative officials in smaller communities, must be made to understand that building a treatment plant implies recognition of a problem and not the means of its dismissal. Public recognition of the need for sewage treatment is growing, though rather slowly. It is the duty of the engineer to guide and direct this recognition to the end that each case may have continuing success.

Rapid Transit in Chicago

FOR more than twenty years Chicago surface and rapid transit transportation has been the football of politics and the subject of many clinical investigations. Engineers have made appraisal after appraisal, plans and still more plans. The end now seems in sight, for on July 1 a referendum is to be taken on a comprehensive scheme of unifying the surface and rapid transit (elevated) companies. They are to be merged into one company, to which a franchise is to be given in order that its securities may be marketed, although the main point advertised is better service. The Insull interests are back of the project, and from all local indications few objections of any weight have arisen. Samuel Insull recently called Chicago Traction the lame duck among other prosperous utilities in Chicago. Bankers and straphangers alike hope that his financial and operating genius will put the same kind of life and efficiency into Traction that has changed the gas company from failure to success and given the user of electricity better service at increasingly lower cost.

Much talk has been heard about the termination of the franchise. With a capitalization close to half a billion, and with Chicago's bonding power even now nearly at an end, termination by purchase is indefinite; moreover, few in Chicago want municipal ownership. The way to amortization is, however, open if the city desires to forego certain extensions and use the earnings for this purpose.

As to the consolidation, it will have the effect of protecting the holders of traction company securities now declining in value, so that further money can be procured for extension.

The companies have not made money for some time. Whether putting them together and largely increasing their operating facilities will produce enough additional car riders to yield more dividends remains to be proved. It is at least open to doubt. Efficiency of operation has a burdensome task ahead.

While there are many engineering problems, probably the one of most general interest is the proposed construction of a four-track subway in open cut in State Street. Many engineers who know the swelling clay on which all but comparatively few buildings on this street are located shake their heads over this proposal. Rock is within a hundred feet of the surface; and plans have been made for tunnels through rock, whose construction would not disturb the sewers, pipes, conduits, cable and other utility services with which the under-pavement space is now occupied.

Some other rapid-transit systems have stations at considerable depth—London and New York both—though elevators or escalators present as cumbersome a problem as open-cut construction of the line. But this matter is a detail of engineering, and the important thing to note is that Chicago has always commanded ample talent to handle its engineering problems, once its political and financial difficulties are out of the way. The people will decide the latter July 1.

Charting a Course

IN A remarkable article published in *Electrical World* two weeks ago there appears an illuminating and highly stimulative analysis of utility regulation from the pen of Matthew S. Sloan, head of the light and power systems of New York City and recognized as one of the forward-looking leaders of the industry. It represents an able attempt to chart the course along which the relations of public utility companies will advance. Naturally enough, in view of the great complexity of the subject, the article does little more than reflect an attitude of mind; but this is at the moment quite as valuable as any specific proposal of procedure.

Mr. Sloan is president of the National Electric Light Association. His article therefore has the added weight of being a keynote statement for the progressive element in the light and power field. Both for this reason and because of the intrinsic weight of his remarks, we feel warranted in extracting from it for the convenience of our readers and in pointing to one or two of his chief declarations.

First, he asserts clearly that regulation by the public is here to stay, essentially under the existing system of utility laws; further, that it is a necessary process and that he is wholly in sympathy with its purposes. This is important because many people have come to believe that utilities are hostile to regulation except when they enjoy that kind of supine or complaisant regulation which has often, and by no means in the remote past, raised wide public resentment against the system and against the public's own servants. Mr. Sloan himself speaks of the outcry that regulation of utilities has failed, and attributes it to the difficulty of controlling corporations made up of fallible human beings through other fallible human beings representing government.

More particularly, it is significant that he says, "The present situation, with utilities grown into great organizations, with large holding company groups interrelated and apparently dominating the field of power supply, with federal and state investigations of utilities and utility laws, contains elements of danger." It does, beyond doubt; and for this reason a rational, open approach to appraising utility relations is so eminently timely. The "basic community of interest between utilities and people" on which Mr. Sloan's analysis relies needs to find more effective expression than it often receives.

One such expression is contained in his article in these words: "Utilities, as a business impressed with public interest, owe an obligation to the people somewhat heavier than ordinary business." If this thought is conscientiously carried into practice it may well do away with many of the antagonisms between the two parties. For there are many details in which the special position of trust which utilities occupy might dictate change in their present working methods. The eventful conflicts between public and utility groups—it is only necessary to recall railroad history—have always been the final result of a period in which the utilities in question disregarded this "heavier obligation" and carried on their business as pure exploitation.

The great contribution which the immediate future can make to the utility problem is to establish in practice the old doctrine, which Mr. Sloan restates most interestingly, that the utilities themselves can remove much of the need and opportunity for regulation by supplying service of high quality at minimum adequate rates and by carrying on their operations in the open. If this becomes practice effectively, the "business rule" rather than the "legal rule" can serve as a yardstick of utility regulation. Recent years have given evidence, we believe, that many commissions and many power utilities are trying to attain this ideal, so that it is apparently the goal of actual as well as theoretical progress.

The doctrines above alluded to, and set forth more fully in extracts from Mr. Sloan's article on another page, are basic with respect to all forms of utility service. The author probably had the light and power industry alone in mind. This is a growing industry, with steadily expanding business and growing profit margin; and as it is still youthful, rapid technical development has year by year lowered costs and should continue to do so for some time. Such conditions are favorable, and make the rule of equity relatively easy to apply. Moreover, a light and power company usually enjoys a monopoly. Consider in contrast the position of a railroad or of a street railway: quite different conditions will be seen to prevail, and it is not so easy to find simple ways of satisfying the two parties simultaneously. The railroad, for example, might justly claim that its narrowly limited business, its competitive position, its fixed rate structure, its battle with rising costs, make the proper application of the principles not so simple. And the street railway may not find these principles helpful in dealing with huge amounts of accumulated obsolescence. Despite these obstacles, we believe that the principles outlined are controlling in all utility fields—and not merely in light and power.

Essentially they do not differ, we believe, from those which have been held by sound thinkers in the field of public service for many years. Many men who based their reasoning on the requirements of public interest reached conclusions of closely similar character. Now that they come from a representative of utilities rather than of the public interest, they acquire a new importance. They indicate the line on which the public relations of utilities can be advanced rapidly and effectively.

Occurrence and Characteristics of Missouri River Cutoffs

Definition and Effects—Analysis of Typical Cutoffs on the Middle and Lower River—Summary of Conditions Affecting Occurrence of Cutoffs

By F. Y. Parker
United States Engineer Office, Kansas City, Mo.

ALL alluvial streams have comparatively long points of land (peninsulas) around which the current flows. Many of these peninsulas cut through, and the new channel across the peninsula is a cutoff. The old river channel forms an oxbow, or horseshoe lake which in the course of years is obliterated.

A true cutoff is accomplished either by alternate or by simultaneous caving on opposite sides of the peninsula, which in time results in opposite concave bends (waist or neck) through which the cutoff is made. Although the final cut-through is sometimes made simultaneously from both sides, it usually occurs from the upstream side. In many instances the river impinges against rocky bluffs or, if under improvement, the banks are diked or revetted and such conditions (natural or artificial interference) inhibit free river action and materially modify or radically change the manner of the cutoff.

The oxbow or horseshoe lake of the true cutoff cannot be mistaken. Cutoffs made in a short period of time and where no well-developed waist or neck has formed in the peninsula are false cutoffs, although the results are just as disastrous to river regime as are those of true cutoffs.

It will be observed later that in all true cutoffs the end of the peninsula is or has been capped by a bar which is usually at its maximum area just previous to the cut-through. Bar building and erosion of the opposite bank are functions that tend to keep the channel in a trough against the eroding bank.

Some of the hydrographic effects of a cutoff are change of slope, shifting of river crossings, new points of bank attack, increase of caving and sedimentation, not to mention occasional river towns (Camden and Amazonia, Figs. 7 and 10) being left miles inland. In fact, a cutoff is a calamity when a river is under improvement, as it upsets the whole river system downstream.

FIG. 1—NECK OF PENINSULA, TRENTON, N. D., CUTOFF
The picture taken June 17, 1912, from the hurricane deck of the snagboat "Mandan" shows the condition a few days before the cutoff occurred, shortening the river by 4 or 5 miles.

Analysis of Typical Cutoffs

The valley of the Missouri River contains many horseshoe lakes, which are the remains and reminders of past cutoffs. A typical few of these cutoffs are analyzed here for the purpose of arriving at some conclusions as to occurrence and characteristics. To illustrate a cutoff about to be completed, views are given of the Trenton cutoff, North Dakota (Figs. 1 and 2). The locations of the cutoffs analyzed in this article are shown in Fig. 3.

Herron Roost Reach (Figs. 4 and 5)—For a similar distance this stretch of river probably contained more cutoffs, accomplished and in the making in 1881, than any other river in the world. The date of cutoff is unknown, but it probably took place in the fall of 1880 or early in 1881. The closing bar and the curvature of the cutoff lake (McCook) indicate that the cut-through came from the upstream side. It will be noticed that the "cutoff" (radius of the bend opposite the tip of the peninsula), about 2,000 ft., was exceptionally small.

At *A* the neck of the peninsula was eroding much faster on the upstream side (1881) than on the downstream side. The probability was that erosion at the neck on the upstream side would be checked before the cut-through was made. The survey of 1895 showed that this predictable checking had occurred; hence the cutoff was delayed until about 1912-13. If the cutoff at *A* had taken place before that at *C*, the increased slope would have greatly hastened the cut-through at *C*. It is a reasonable deduction that the final cut-through was made from the upstream side.

Since the cutoff radius was more than 4,000 ft., the cutoff should not have taken place and did not take place previous to that at *C*, whose radius was barely 3,000 ft.

It will be noted that the "bight of the bend" (or deepest curvature opposite the peninsula tip) at *C* was about in line with the peninsula, hence the cut was probably made simultaneously from both sides of the neck.

Comparison of the surveys of 1881 and 1895 shows that a secondary cutoff took place across the bar capping the peninsula. This is most unusual and can be attributed

only to more rapid upstream erosion of the neck with greater convexity of bend and resultant reaction from the left bank. In about 32 years four cutoffs took place in this stretch of river.

St. Mary's Bend (Fig. 6)—The probable cause of this temporary and false cutoff was upstream, right-bank bluff contact coincident with a suitable river stage. Similar reasons apply to Camden and Nigger Bends hereafter discussed.

The aftermath of this cutoff differs appreciably from that of other known cutoffs, since the new channel silted up and the river gradually moved back to its old channel. Further erosion was checked and a probable cutoff at *A* was prevented by the revetting of the bank by the Burlington railroad. Were the bank in the bend not protected, a cutoff at *A* would probably develop in a few years.

FIG. 2—NARROWEST BANK IN PENINSULA, TRENTON CUTOFF
At this point the bank was 1 ft. wide on top and 10 ft. through at the water line. The head of water was 4 ft. greater on the up-river side.

Amazonia Bend (Fig. 7)—The most noticeable feature about this cutoff was that the cut was being made from the downstream side of the peninsula. This anomaly was due to bluff contact at Amazonia, which caused Amazonia Bend to flatten and twisted the bight of the bend downstream. The date of the cutoff is unknown, but it should have occurred late in 1879 or early in 1880.

Liberty Bend (Fig. 8)—The conditions in this bend would be similar to those that prevailed in Amazonia Bend were it not for artificial restraints (revetment) at the foot of the bend and on both sides of the peninsula neck. Bluff contact in the cutoff curve, with flattening and twisting of the bight of the bend downstream, would (were the revetment removed) soon duplicate the Amazonia cutoff, since the cutoff radius is only about 3,000 ft.

Removal of the downstream (from bluffs) peninsula and left-bank revetment would induce a cutoff from the downstream side. Removal of the upstream peninsula revetment would produce a cutoff from the upstream side. Removal of all bank protection would accelerate the cutoff, but the cut-through would be accomplished from the downstream side.

Bowling Green Bend (Fig. 9)—In 1878 the cutoff radius of Bowling Green Bend was about 3,500 ft., and with no interference in sight, an early cutoff could be confidently predicted. The cutoff was accomplished in 1879 and, as could be foreseen, from the upstream side. Since 1879 the river has steadily moved south and is now at bluff contact, approximately 3¾ miles from its former position.

Camden Bend (Fig. 10)—This false cutoff occurred in July, 1915. High river stages prevailed during the year—between April and August eight wave crests occurred.

At Camden Bend a breach was made through the revetted bank and 8 miles of river was reduced to 2 miles overnight. The cutoff was made during the fifth rise and without any preliminary indications. At this time Fishing River Island, 6 miles upstream, caused a double or split channel with the greatest flow along the left bank instead of through the normal channel along the right bank. These channels merged and made bluff contact immediately above Napoleon. Had the volume of water along the right bank been the greater, the cutoff would not have taken place. In 1878 the narrowest part (neck) of the peninsula was about 2¼ miles. In 1890 this distance had not materially changed, but in the year of the cutoff the width was about 1½ miles, which reduction in distance had practically all taken place from the upstream side.

Since the cutoff, the river movement (1915-28) has been northward at an average annual rate of about 400 ft.; further movement has been prevented by revetment.

It will be observed that a fortuitous combination of river stages, split channels and possibly on-shore winds breached the revetment and made the cutoff possible. It is also likely that the successive wave crests weakened the existing revetment and that there were small breaks in the riprap. It is a well known fact that all riprap that has been covered with sediment (masked) and then subjected to strong river attack is easily breached.

Glasgow Bend (Fig. 11)—The upstream side of the peninsula had been protected by about 13,000 ft. of revetment, which was later supplemented, downstream to the point, by training and shore dikes.

Due to upstream erosion of the left bank, the river attack moved downstream and the age-weakened dikes were destroyed (1922-23). Caving along this unprotected bank then became severe and only by the greatest effort was the river prevented from breaching the C.&A. R.R. embankment and duplicating the Camden Bend débâcle.

Despite a favorable cutoff radius (about 2,000 ft.), it is not possible for a true cutoff to occur. At several river localities (Glasgow, Mo., is one) the river channel hits the bluffs practically at right angles. At such places the river momentum is negligible, being transferred into swirls and eddies. Immediately below such contact points there is usually a stretch of deep, narrow river with reduced current. These stretches are called "bottlenecks."

The channel impact against the Glasgow bluffs creates a bottleneck river at Glasgow with reduced momentum. This condition, combined with downstream bluff contact

Fig. 3 – Missouri River Between Sioux City, Iowa and St. Louis, Mo. Showing Cutoff Localities

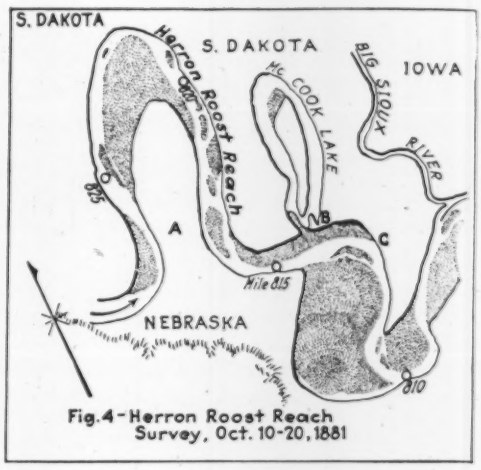


Fig. 4 – Herron Roost Reach Survey, Oct. 10-20, 1881

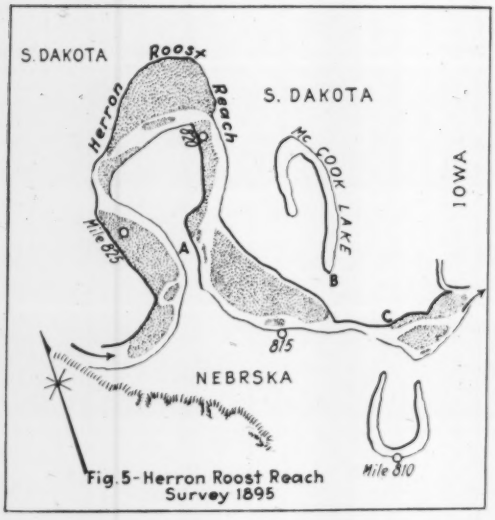


Fig. 5 – Herron Roost Reach Survey 1895

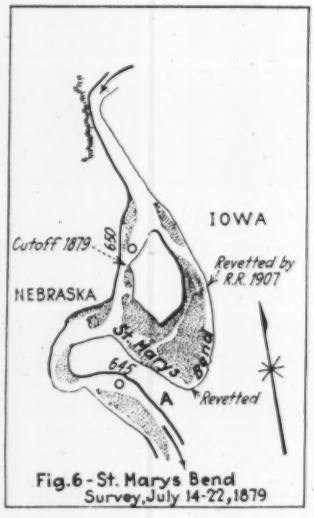


Fig. 6 – St. Marys Bend Survey, July 14-22, 1879

Fig. 7 – Amazonia Bend Survey, Aug. 19-25, 1879

Fig. 8 – Liberty Bend Survey, Oct., 1928

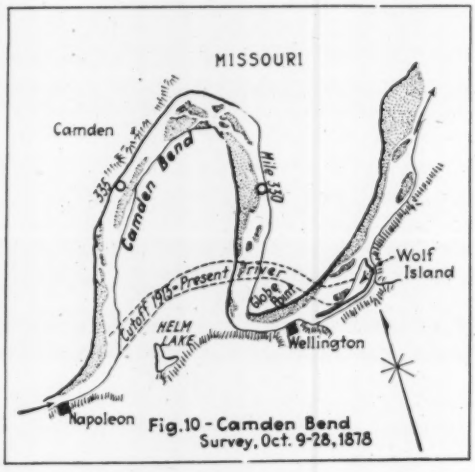


Fig. 10 – Camden Bend Survey, Oct. 9-28, 1878

Fig. 11 – Glasgow Bend Survey, Oct. 20, 1928

Fig. 9 – Bushwhackers Bend, Bowling Green Bend and Mammy Bend Survey, Nov. 15-26, 1878

Fig. 12 – Nigger Bend Survey, Oct. 20, 1928

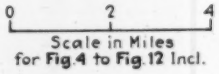


FIG. 3—MAPS OF TYPICAL CUTOFFS ON WHICH CONCLUSIONS ARE BASED

for several miles, prevents normal river movements and resultant erosion of the peninsula neck. There is, however, a constant danger that a combination of fortuitous circumstances may breach the revetted bank and produce an abortive cutoff across the embankment of the C. & A. railroad.

Nigger Bend (Fig. 12)—The topography of this bend, river-bluff contact and cutoff accomplishment, were almost identical with those of Camden Bend; incidentally, both cutoffs took place the same month and year.

Despite a revetted bank, an abortive cutoff was made during the high water of 1915.

As in all phenomena of this kind, cause and effect are always apart—in some cases, many miles. In this instance upstream channel deflection, bluff contact, deflection of the channel with river constriction and a favorable stage accomplished the cutoff. Above the right-bank bluffs the river flows almost due southwest for 2 miles and makes bluff contact about 2 miles above the cutoff. The point of contact between high and low stages ranges over a distance of about 2,000 ft. During high stages the increased velocity deflects the river from the bluffs (angle of incidence and deflection about 90 deg. and 96 deg. respectively) across the opposite bar to the cutoff. A low-water dike, across the head of the cutoff and bank revetment has thus far prevented enlargement of the cut at this point.

Conclusion From Analyses

1. When a cutoff radius approaches 3,000 ft., the cutoff is imminent.

2. When the deepest part (bight) of the bend, opposite the tip of the peninsula, is in line with the peninsula and there are no natural (bluffs) or artificial (dikes or revetment) restraints to interfere with river action, a true cutoff is in the making and its accomplishment will be in minimum time, when simultaneous caving occurs on both sides of the peninsular neck.

3. Interference by clay or gumbo banks will delay a cutoff and may cause it to break through on the downstream or upstream side, regardless of other conditions.

4. If the bight of the cutoff curve is materially downstream or upstream from the axis of the peninsula, the side on which the cut-through will be made can be readily predicted.

5. The true cutoff forms approximately a conic parabola with the major axis lying in line with the cutoff peninsula.

6. Natural or artificial interference may result in false cutoffs which may be maintained (Camden Bend) or result in silt-ups (St. Mary's Bend).

7. Bends are in a continual flux; mergers, eliminations and new formations are in all stages of accomplishment.

Radius Lengths of Typical Bends

Some past and present, approximate, cutoff radii follow:

	Radius, Ft.
Amazonia Bend	3,700
Herron Roost Bend	2,000
Bowling Green Bend	3,500
Teteseau Bend	3,000
Lake Contrary Bend	4,000
Cutoff Lake Bend	3,000
Manawa Bend	3,200

The average is 3,200 ft. This average, verified by other radii measurement, induced paragraph 1 of the conclusions.

Highway Added to Quebec Bridge Between Railway Tracks

Famous Cantilever Structure Designed and Built for Railway Service Is Now a Link in Canadian Highway System

By Jacques Jobin

Assistant Engineer, Department of Public Works and Labor, Quebec, Canada

THE vacant space left in the middle of the Quebec bridge between the track girders is now occupied by a new vehicular roadway. The famous bridge which spans the St. Lawrence River 6 miles above Quebec City was originally designed for railway service and has carried two tracks and two sidewalks since it was opened in 1917. As shown by Fig. 3, the tracks were placed symmetrically about the center line with the sidewalks between them and the trusses. When it was proposed to link by roadway the highways on both sides of the St. Lawrence, studies showed that it could be accomplished by placing a new roadway between the tracks, approximately on the same deck level without disturbing the existing track.

The floorbeams of the new vehicular roadway are 18-in. I-beams riveted to the stiffeners of the existing track girders. Beams weighing 48 lb. per foot were used except at the expansion joints, where 86-lb. beams were necessary. Stringers of 8-in. I-beams are carried on the top flanges of the floorbeams. The stringers are spaced 3 ft. on centers, and vary from 10 to 15 ft. in length.

A rather complete system of expansion joints was necessary, as shown by Fig. 3. An overlapping plate-type joint was used at the central panels of the suspended span, at the main posts between the anchor arms and cantilevers, and at the intermediate joints of both the

FIG. 1—NEW VEHICULAR ROADWAY ON QUEBEC BRIDGE
All railway traffic is at present diverted to north or left-hand track, eliminating a grade crossing.

anchor and cantilever arms. The normal openings at these joints vary from 2½ to 3 in., with a minimum of 1 in. and a maximum of about 3½ in. At the junction of the cantilevers with the suspended span and of the approach spans with the anchor arms a comb-expansion detail had to be used. Other expansion joints were provided between all railway track girder spans, spaced from 32 to 42 ft. apart.

The flooring consists of a reinforced-concrete slab 7 in. thick seated on the steel stringers. The slab forms were made of corrugated galvanized sheet iron and were left in place. Monolithic curbs extending 11 in. above the pavement are used.

FIG. 2—NEW HIGHWAY APPROACH TO QUEBEC BRIDGE
At right, a parking space is under construction. The guardian's kiosk in the foreground is to be replaced by a concrete structure.

One of the important questions involved in the project was how to connect the bridge roadway to the main highways. The topography of the land on both sides of the river is somewhat hilly, and in addition it was necessary to eliminate four railroad grade crossings. It was at first suggested to build trestles on both shores at the outlets of the bridge, the north trestle to carry the roadway over the track and the south trestle to carry the tracks over the roadway. Of the four railroad crossings encountered by the road, two are branch lines actually unused. However, the two crossings at the ends of the bridge are over the Canadian National Railway's main line. A temporary solution was devised by diverting the railroad traffic to the west track of the bridge, inasmuch as one track has been carrying the major part of the railway traffic and probably will be adequate for some years to come. When increased railroad traffic necessitates the use of both tracks, the proposed trestles will probably be built. The relation of the roadway to the tracks at the bridge approaches is clearly indicated in the photographs reproduced as Figs. 1 and 2.

In erecting the steel and pouring the slabs, the contractors used a traveler running on rails mounted on the top flange of the track girders. The construction work, which was begun in May, 1929, was divided into four contracts: steelwork, Eastern Canada Steel Co., of Quebec; concrete floor and north approach, T. E. Rosseau et Compagnie, Quebec; south approach, M. Trudel et Fils, St. Irene, Quebec. The design and construction of the new roadway was under the direction and supervision of Ivan E. Vallee, chief engineer and Deputy Minister of the Department of Public Works and Labor, assisted by Olivier des Jardins, joint chief engineer. Messrs. Monsarrat and Pratley, of Montreal, acted as consulting engineers. Michael L. Guimont was resident engineer for the Department of Public Works and Labor. The total cost of the construction did not exceed $400,000.

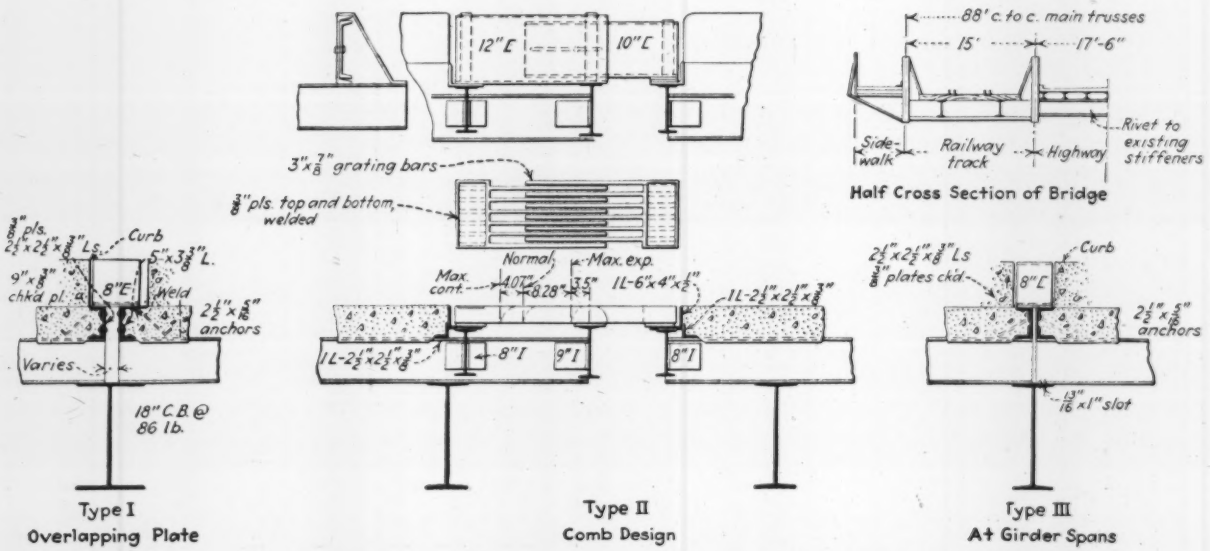


FIG. 3—DETAILS OF NEW VEHICULAR ROADWAY ON QUEBEC BRIDGE
Type 1 expansion joint is used at the central panels of the suspended span, at the main posts between the anchor arms and the cantilevers and at intermediate joints in the anchor and cantilever arms. Type 2 joint is used at the junction of the cantilevers with the suspended span and of the approach spans with the anchor arms. Type 3 is used between all railway track girder spans.

Design of Monolithic Concrete Siphons Simplified by Use of Diagrams

United States Bureau of Reclamation Develops Diagrammatic Method of Designing Siphons for Use on Its Irrigation Canals— Manner of Application Illustrated

By J. J. Doland

Assistant Professor of Civil Engineering, University of Illinois, Urbana, Ill
Formerly Engineer, U. S. Bureau of Reclamation

INVERTED siphons are used frequently for conveying water across a depression or valley. In cases where maintenance cost and longevity are important factors it is usually desirable to adopt reinforced-concrete construction if the hydrostatic head obtaining will permit.

Reinforced-concrete siphons may be constructed of precast sections assembled in place or may be poured monolithically. The former type is usually adopted where size, location and quantities will allow its economical use. The latter type is generally preferable in remote localities and for siphons of large diameter. This discussion will deal entirely with examples of and design methods for the monolithic type.

The United States Bureau of Reclamation has built a large number of these structures and it is believed that its design methods are economical and at the same time structurally safe. The structures designed by the bureau cover wide ranges in diameter of barrel and hydrostatic head. The Dry Creek siphon on the Riverton project in Wyoming, with a diameter of 20 ft., represents the present upper limit of barrel size and the Hayward Canyon siphon on the Kittitas division of the Yakima project in Washington represents the greatest hydrostatic head (152 ft.) for which monolithic siphons have thus far been designed.

The Stokes Gulch siphon on the Grand Valley project, Colorado, serves as a good illustration of an average structure of this type. Its barrel is 12 ft. in diameter, is 166 ft. long and operates under a maximum head of 28 ft. Fig. 3 shows the construction details of this structure and Fig. 1 shows it just after it was placed in operation. Fig. 2 is a construction photograph show-

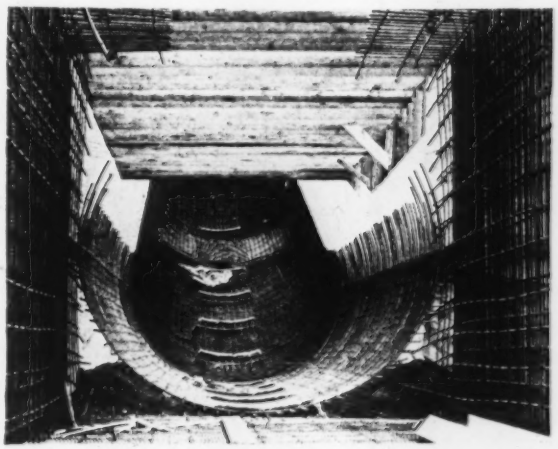


FIG. 2—METHOD OF PLACING REINFORCING STEEL, STOKES GULCH SIPHON

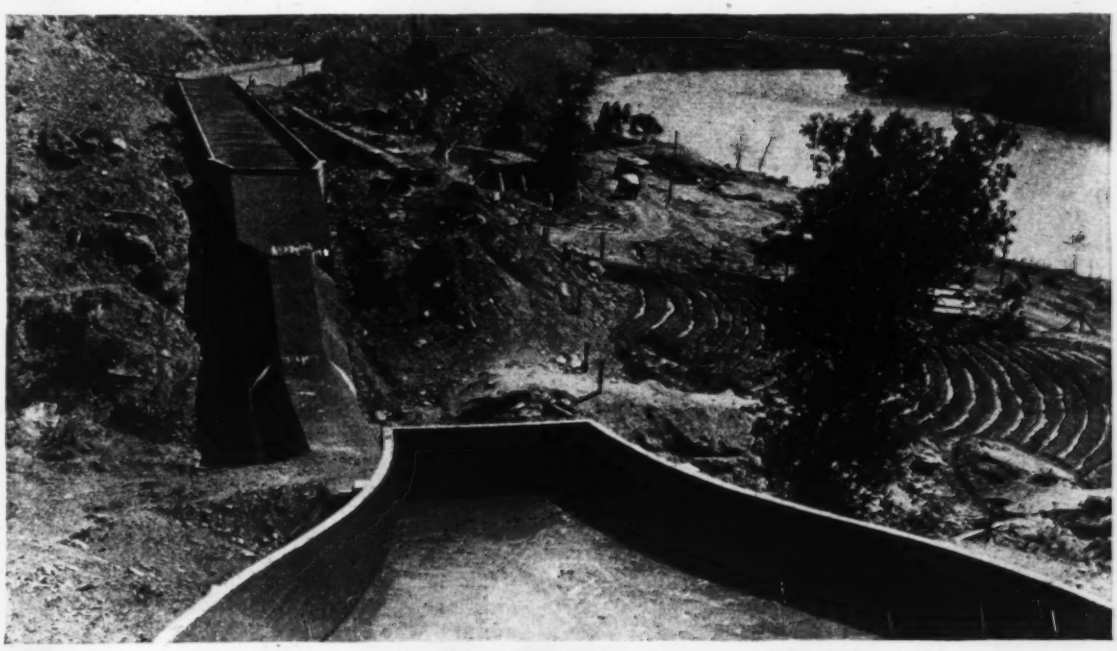


FIG. 1—STOKES GULCH SIPHON, GRAND VALLEY RECLAMATION PROJECT

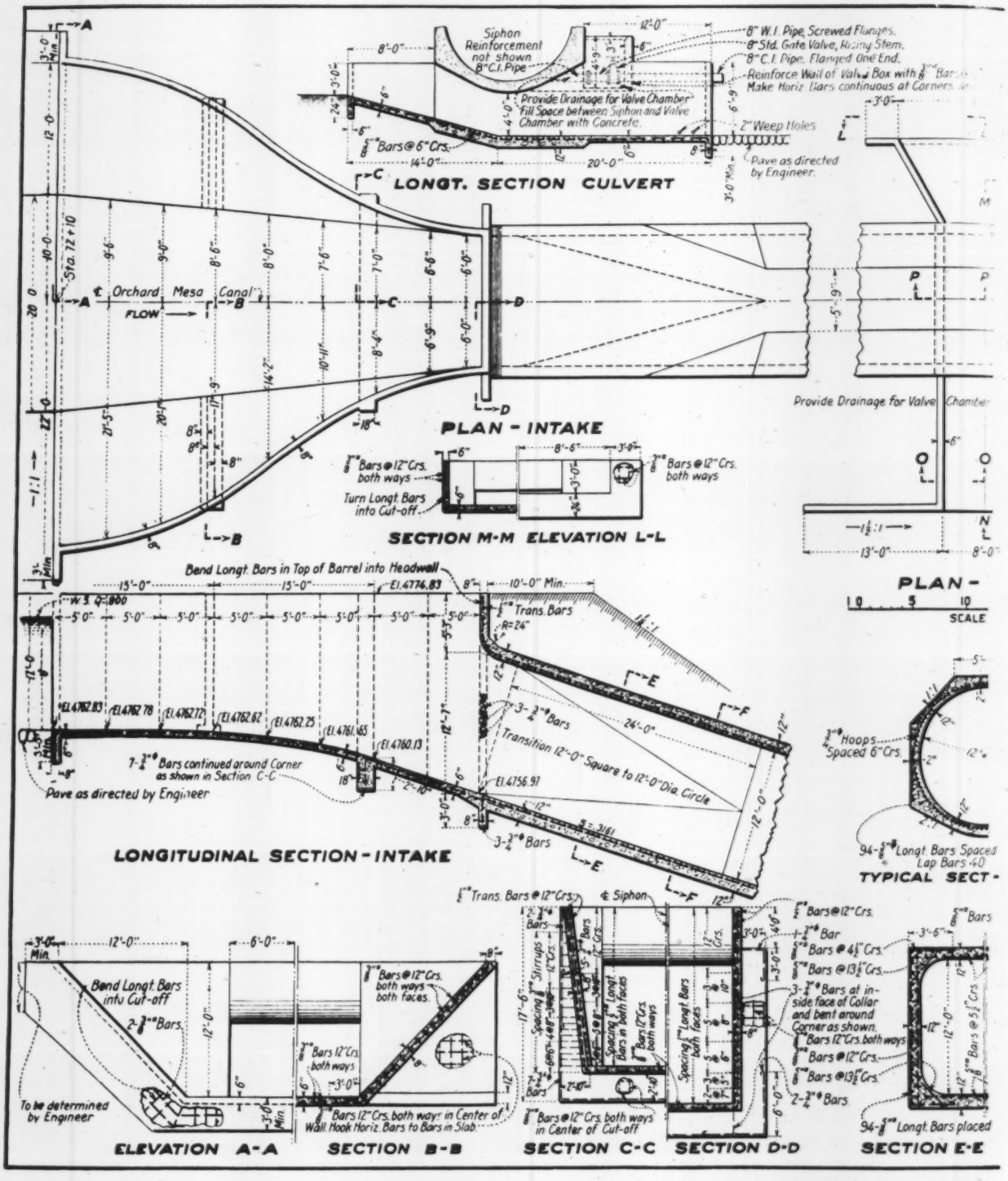

LONGT. SECTION CULVERT
PLAN - INTAKE
SECTION M-M ELEVATION L-L
PLAN
LONGITUDINAL SECTION - INTAKE
TYPICAL SECT
ELEVATION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
Orchard Mesa Canal
FLOW
Siphon Reinforcement not shown
8" C.I. Pipe
8" W.I. Pipe, Screwed Flanges.
8" Std. Gate Valve, Rising Stem.
8" C.I. Pipe, Flanged One End.
Provide Drainage for Valve Chamber
Fill Space between Siphon and Valve Chamber with Concrete.
2" Weep Holes
Pave as directed by Engineer.
Bars @ 6" Crs.
Sta. 12+10
Bend Longt. Bars in Top of Barrel into Headwall
El. 4774.83
Trans. Bars
Transition 12'-0" Square to 12'-0" Dia. Circle
Bars continued around Corner as shown in Section C-C
Pave as directed by Engineer
Hoops Spaced 6" Crs.
Longt. Bars Spaced
Lap Bars 40
Bend Longt. Bars into Cut-off
To be determined by Engineer
Bars @ 12" Crs. both ways both faces
Bars 12" Crs. both ways
Bars 12" Crs. both ways in Center of Wall Hook Horiz. Bars to Bars in Slab
Siphon
Bars @ 12" Crs.
Bar
Bars at inside face of Collar and bent around Corner as shown.
Bars @ 4½" Crs.
Bars @ 13½" Crs.
Bars 12" Crs. both ways
Bars @ 12" Crs.
Bars @ 13½" Crs.
Bars @ 12" Crs. both ways in Center of Cut-off
Longt. Bars placed
Provide Drainage for Valve Chamber
SCALE

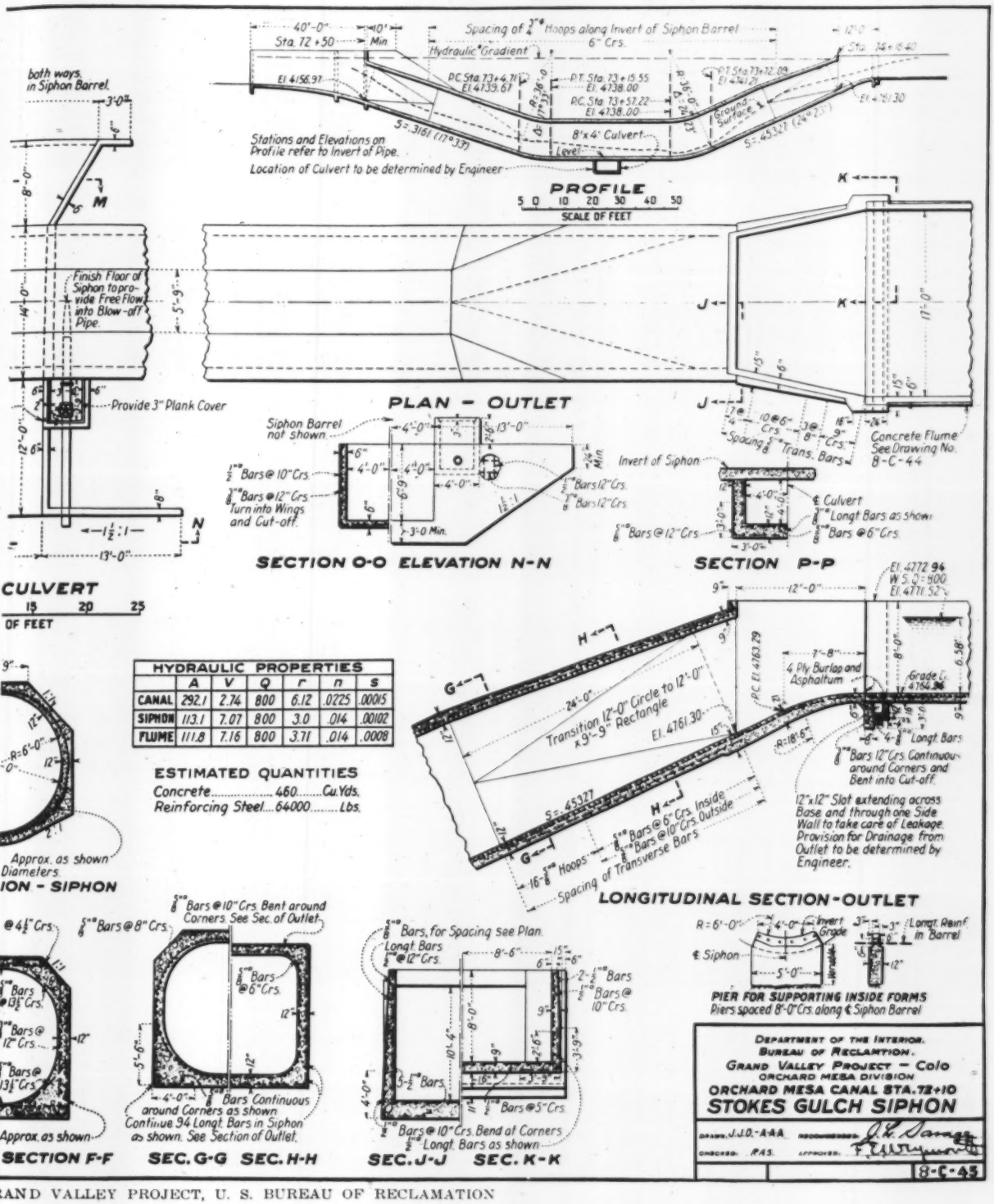
FIG. 3—DETAILS OF THE STOKES GULCH SIPHON.

ing the formwork and the reinforcing steel. Table I gives the general dimensions of other important monolithic siphons already built or now under construction by the Bureau of Reclamation.

Design of Barrel—The method of design of the barrel only is indicated in Fig. 4. The use of the diagrams and the terminology are explained in the figure. The data given represent a recent revision of design methods which have been in use by the bureau for several years. The design and proportioning of the transitions are a separate problem and are not treated in this discussion.

The forces acting on a siphon barrel are: (1) the weight of the backfill; (2) the weight of the pipe itself; (3) the horizontal earth reaction; (4) the foundation reaction; (5) the weight of the water just filling the pipe; and (6) the hydrostatic pressure caused by the head of water on the pipe, measured vertically from the hydraulic gradient to the inside top of the pipe at the section under consideration.

The load due to the backfill is assumed to be uniformly distributed over the horizontal diameter and is determined by the formula $P = C_1 w B^2$, where C_1 is a coefficient depending upon the nature of the backfill conditions of loading and height of backfill, w is the weight



GRAND VALLEY PROJECT, U. S. BUREAU OF RECLAMATION

of fill per cubic foot, and B is the outside diameter of pipe in feet. This formula is based upon the experiments carried on at Iowa State College and is described in Bulletin 31 of that institution. The curves in Fig. 5 give the solution of the formula for the ordinary conditions encountered in siphon design. The horizontal earth reaction is assumed to be uniformly distributed over the vertical projection of the bottom half of the pipe. The intensity of this reaction is assumed to be equal to one-fifth the passive resistance of the earth and is determined from the formula $R_h = 0.1\,wr^2\left(\frac{1+\sin\phi}{\cos\phi}\right)^2$, where w is the weight of earth in pounds per cubic foot, r is the radius of pipe in feet, and ϕ is the angle of repose of the earth. The foundation reaction is assumed to be uniformly distributed over the base, since construction specifications usually require that the barrel shall be founded upon undisturbed material.

With these conditions fixed, it is possible to derive coefficients for moments and thrusts for any ordinary condition of loading, in terms of the internal radius when the minimum thickness is also made a function of that radius. These coefficients are shown in Table I of Fig. 4.

The first analysis made in the determination of these coefficients assumed that the barrel was a circular ring of the minimum thickness t. This assumption admitted the application of a relatively simple algebraic solution. The second analysis was made by dividing the actual section (typical section, Fig. 4) into voussoirs and summating the effect of each division. The results of the two methods were in remarkable agreement. The results of the second method were chosen for Table I of Fig. 4 for the reason that they provide a slightly greater factor of safety.

When the moment and thrust at any given section are known, the eccentricity e may be determined by dividing the moment by the thrust. For pipes having a single line of reinforcement the center of moments is taken at the center of gravity of the effective section. By applying the principles of statics an equation giving the relation between k, P and e/d is easily derived. The curves in the upper left-hand section of Diagram 1, Fig. 4, give the solution of this equation for certain values of e/d, and other values may be interpolated. By equating the horizontal forces to zero an equation giving the relation between $\frac{T}{12\,d}$, p, k, fc and fs may be derived. This equation is solved by means of the curves in the lower right-hand section of Diagram 1, Fig. 4.

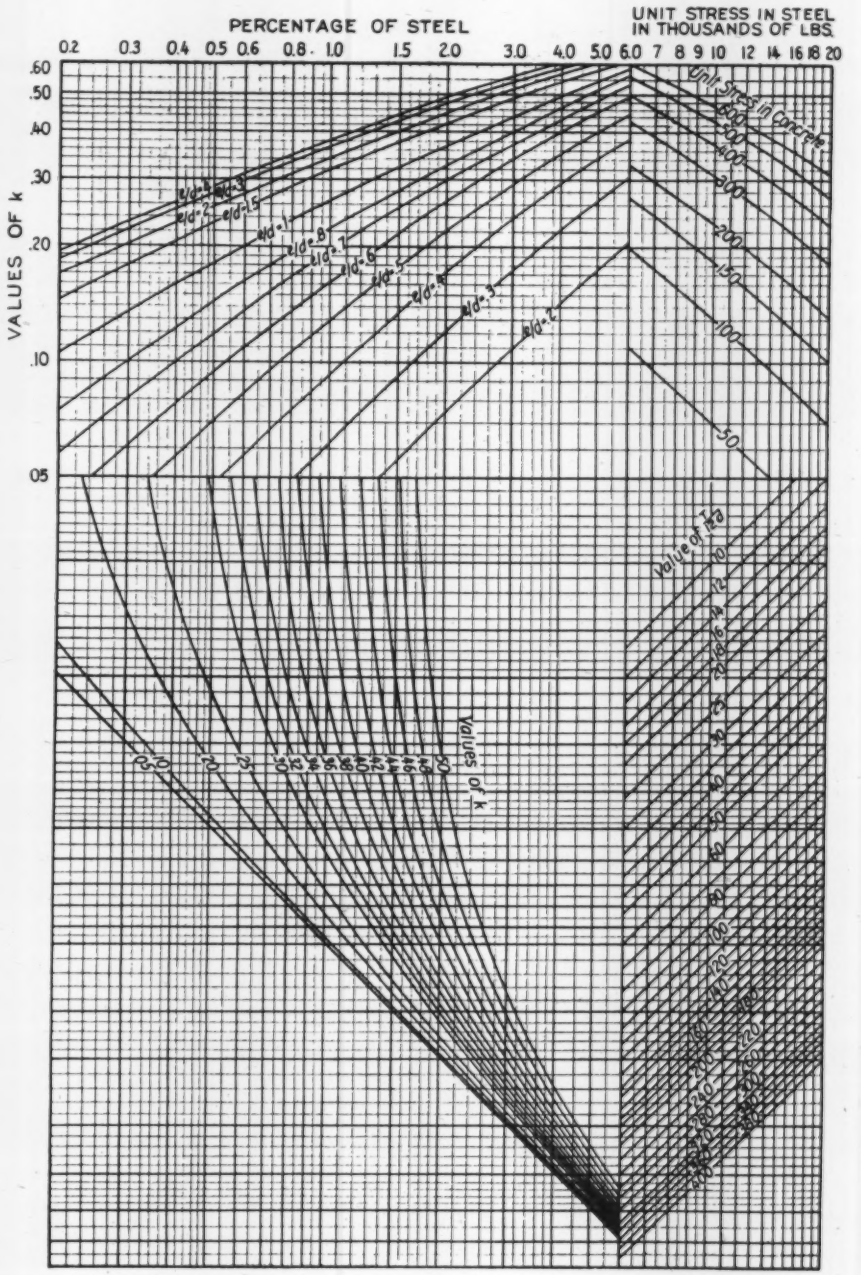


DIAGRAM I.

FIG. 4—METHOD OF DESIGNING

With this information at hand, the actual design process is relatively simple. After the profile and diameter of the structure are determined, the designer prepares a table showing the depth of backfill and hydrostatic head at convenient stations. Moments are determined from the coefficients, and thrusts are computed by combining the thrust given by the coefficients with the thrust due to hydrostatic pressure. The table is then extended to include M/T, e/d, T/d, fs and fc. The required stresses may be determined by following the directions for the use of Diagram I, Fig. 4.

When the required spacing of reinforcing steel becomes less than the minimum allowable spacing, it is necessary to use a double layer of reinforcement. The

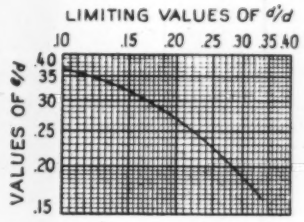


DIAGRAM 2.

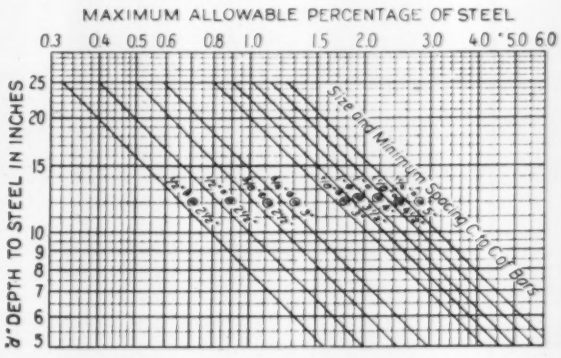

MAXIMUM ALLOWABLE PERCENTAGE OF STEEL
0.3 0.4 0.5 0.6 0.8 1.0 1.5 2.0 3.0 4.0 5.0 6.0
d" DEPTH TO STEEL IN INCHES
25 20 15 10 9 8 7 6 5
Size and Minimum Spacing C to C of Bars

DIAGRAM 3.

TABLE I

COEFFICIENTS FOR MOMENT AND THRUST

	THRUST IN POUNDS PER LINEAR FOOT		MOMENT IN FOOT POUNDS PER LINEAR FOOT	
	TOP	BOTTOM	TOP	BOTTOM
Water	− 37.41 r^2	− 87.59 r^2	+ 12.19 r^3	+ 10.65 r^3
Pipe	− 7.79 r^2	+ 7.79 r^2	+ 113.27 r^3	+ 12.00 r^3
Horizontal Earth Reaction	+ 10.70 r^2	+ 36.87 r^2	− 4.64 r^3	− 5.39 r^3
Sum	− 34.50 r^2	− 42.93 r^2	+ 20.82 r^3	+ 17.26 r^3
Earth Cover	0	0	+ .128 Pr	+ .077 Pr

P = Total Load on Top of Pipe in Pounds per Linear Ft

TABLE II

THICKNESS OF PIPE "t"

HEAD IN FEET	INCHES TO NEAREST INCH
0 - 40	D/12 *
40 - 80	D/12 + 1"
80 - 100	D/12 + 2"
100 - 120	D/12 + 3"
120 - 140	D/12 + 4"
140 - 160	D/12 + 5"

D = Inside Diameter of Pipe in Inches. Minimum 6"

TABLE III

ALLOWABLE STRESS IN REINFORCING

HEAD IN FEET	POUNDS PER SQ. INCH
0 - 20	14,000
20 - 40	13,000
40 - 60	12,000
60 - 80	11,000
80 - 100	10,000
100 - 120	9,000
120 and Over	8,000

TABLE IV

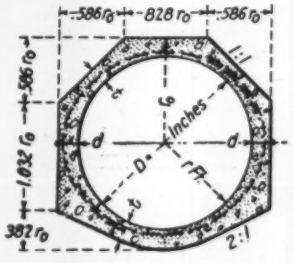
EFFECTIVE DEPTH TO STEEL

Diameters less than 8" Total Thickness − 2"
Diameters from 8' to 12' " " − 2½"
Diameters 12' or more " " − 3"

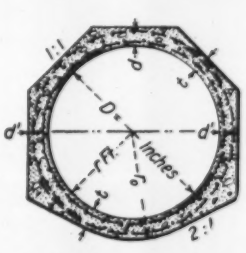
Note: Longitudinal Reinforcement;
For Covered Pipe ..... 0.25 of 1%
For Exposed Pipe ..... 0.50 of 1%
Allowable Stress in Concrete 600 lbs. per sq. in.

EXPLANATION

1. From the Coefficients in Table I determine for each Linear Foot of Pipe Total Moment M in Foot Pounds and the Thrust T, in Pounds due to all Loads other than the Hydrostatic Pressure.
2. Determine the Thrust T_2 due to the Head measured from the Hydraulic Gradient to the Inside Top of Pipe $T_2 = 62.5 \times$ Hd. in Ft. x Inside Radius of Pipe in Ft.
3. Determine Total Thrust T from $T = T_1 + T_2$.
4. Determine the Eccentricity "e" in Inches from $e = \frac{M}{T} \times 12$.
5. Determine the Relation e/d when "d" equals Depth to Steel in Inches.
6. Determine $\frac{T}{12d}$.
7. Enter Diagram I at Top with an assumed percentage of Steel, proceed Vertically Downward to the Value of e/d determined in 5, Read Value of k at Left.
8. Continue Vertically Downward on the percentage first assumed to the Line corresponding to the Value of k determined in 7, thence to the Right to the Intersection with the Line corresponding to the Value $\frac{T}{12d}$ determined in 6, thence Vertically Upward to the Value of k determined in 7 and Read the Stress in the Concrete, Continue Vertically Upward and read the Stress in the Steel. If above or below allowable Stresses assume a new percentage and repeat.
9. When the Hydrostatic Pressure is sufficient to require Two Layers of Steel, determine the Relation d'/d where d' equals the Depth to the Steel in Inches from the nearest Face of the Concrete.
10. In Diagram 2 determine the Limiting Value of e/d for the Relation of d'/d determined in 9. This Value of e/d indicates the Point at which the change from Single to Double layers of Steel is made. Compute the Area of Steel required for Double layer Reinforcement by the Hydrostatic Head on Center of Pipe.
11. The required Spacing of Steel applies to the Shorter Arc of Vertical Curves in the Pipe. Diagram 3 gives the Maximum allowable percentage for different Sizes of Bars for variable effective Depths to Steel
12. Maximum spacing of Bars = 1.5 d (Maximum 12")



TYPICAL SECTION
SINGLE LAYER-REINFORCEMENT



TYPICAL SECTION
DOUBLE LAYER-REINFORCEMENT

Note:
Lap Circumferential Bars on 45° Axis of Pipe.
Determine P in Table I from Dwg. X-C-98
Area of Section 3.356 r_o^2 π r^2

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
DENVER OFFICE
DESIGN OF
MONOLITHIC CONCRETE SIPHON BARRELS

DRAWN: J.J.D. RECOMMENDED: J.L. Savage
TRACED: C.B.G. APPROVED: A.S. Kalten
CHECKED: J.J.D.

X-D-444

point of change is determined by that point at which there would be no compression in the concrete if the pipe were double-reinforced. Diagram 2 of the figure determines this point by giving the limiting value of e/d for a corresponding value of d'/d which may be determined from the dimensions of the pipe. After changing from a single to a double layer it is necessary to reinforce only for the tension caused by the hydrostatic pressure on the center of the pipe.

The allowable stresses are kept low, first, to secure greater watertightness by a more uniform distribution of stress due to the greater percentage of steel required, and

second, to provide additional factor of safety.

The thickness of pipe and depth to steel are based on the experience of the Bureau of Reclamation and approved practice.

With a little practice the foregoing design method is very simple in its application. It eliminates practically all of the tedious computation necessary to an original solution. Care should be taken, however, to keep all factors in their proper units. Failure to do this is likely to lead an inexperienced designer into serious errors. It should be noted that the value of the thrust T is in pounds per linear foot of pipe. Diagram 1 of Fig. 4 is based on the thrust per linear inch of pipe. This accounts for the value 12 in the expression $T/12d$, for the curves in the lower right hand section of the diagram.

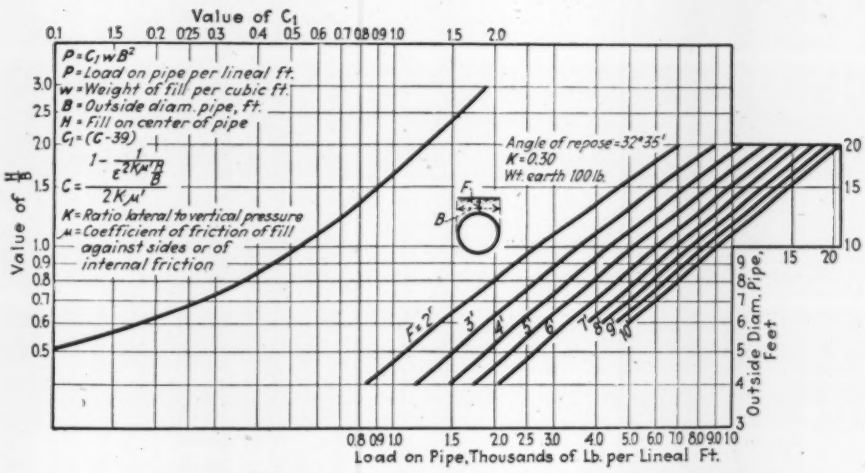

Value of C_1
$P = C_1 w B^2$
P = Load on pipe per lineal ft.
w = Weight of fill per cubic ft.
B = Outside diam. pipe, ft.
H = Fill on center of pipe
$C_1 = (C-39)$
$C = \frac{1-\frac{1}{\epsilon^{2K\mu'\frac{H}{B}}}}{2K\mu'}$
K = Ratio lateral to vertical pressure
μ = Coefficient of friction of fill against sides or of internal friction
Value of $\frac{H}{B}$
Angle of repose = 32°35'
K = 0.30
Wt earth 100 lb.
Outside Diam. Pipe, Feet
Load on Pipe, Thousands of Lb. per Lineal Ft.

FIG. 5—LOADS ON PIPE FOR DIFFERENT DEPTHS OF FILL

The designs of concrete siphons and other canal structures built by the Bureau of Reclamation are made under the immediate direction of H. R. McBirney, designing engineer for canals, and J. L. Savage, chief designing engineer. All engineering and construction work of the bureau is under the direction of R. F. Walter, chief engineer, Denver, Colo., and all activities of the bureau are under the general charge of Dr. Elwood Mead, commissioner, Washington, D. C.

TABLE I—REPRESENTATIVE MONOLITHIC REINFORCED-CONCRETE SIPHONS CONSTRUCTED BY THE U. S. BUREAU OF RECLAMATION

Project	State	Name of Siphon	Diam. of Barrel, Ft.	Diam. of Barrel, In.	Total Length, Ft.	Maximum Head, Ft.
Boise	Idaho	Boise River	5	6	1,987	68
Boise	Idaho	Indian Creek	5	0	176	13
Ft. Peck	Montana	Poplar East	4	9	181	97
Grand Valley	Colorado	Colorado River	12	0	562	54
Grand Valley	Colorado	Mann's Gulch	12	0	193	23
King Hill	Idaho	Tuanna	8	0	334	98
King Hill	Idaho	Little Pilgrim	7	0	479	95
King Hill	Idaho	Cassia	7	6	252	77
Klamath	Ore.-Calif.	Lost River Crossing	5	3	284	20
Klamath	Ore.-Calif.	Lost River	6	3	523	32
No. Platte	Neb.-Wyo.	Browns Canyon	11	0	269	58
No. Platte	Neb.-Wyo.	Owl Creek	12	0	746	53
No. Platte	Neb.-Wyo.	Kiowa Creek	12	0	585	31
No. Platte	Neb.-Wyo.	Bratten Creek	7	0	284	20
No. Platte	Neb.-Wyo.	W. Upper Dugout Creek	7	0	142	12
No. Platte	Neb.-Wyo.	E. Upper Dugout Creek	7	0	110	13
No. Platte	Neb.-Wyo.	Stiver Canyon	10	6	1,669	84
No. Platte	Neb.-Wyo.	Carter Canyon	7	0	264	37
No. Platte	Neb.-Wyo.	Rood Canyon	6	0	250	25
No. Platte	Neb.-Wyo.	Gardner Canyon	5	3	214	30
No. Platte	Neb.-Wyo.	Cedar Canyon	7	0	798	55
No. Platte	Neb.-Wyo.	Muddy Canyon No. 1	6	0	377	39
No. Platte	Neb.-Wyo.	Muddy Canyon No. 2	6	0	178	37
No. Platte	Neb.-Wyo.	Hope Creek	8	6	450	27
No. Platte	Neb.-Wyo.	Little Cedar No. 1	7	0	197	32
No. Platte	Neb.-Wyo.	Little Cedar No. 2	7	0	164	40
No. Platte	Neb.-Wyo.	Congo Canyon High Line	6	6	52	39
No. Platte	Neb.-Wyo.	Congo Canyon Low Line	8	6	293	30
No. Platte	Neb.-Wyo.	Horse Creek	6	6	176	33
No. Platte	Neb.-Wyo.	Winters Creek	8	0	253	29
No. Platte	Neb.-Wyo.	Nine Mile	8	0	176	21
No. Platte	Neb.-Wyo.	Cherry Creek	5	8	601	17
No. Platte	Neb.-Wyo.	West Indian Creek	7	3	310	26
No. Platte	Neb.-Wyo.	Indian Creek	7	3	390	22
Rio Grande	N. M.-Tex.	Rincon	5	0	550	13
Rio Grande	N. M.-Tex.	Hatch	6	0	650	13
Rio Grande	N. M.-Tex.	Juan de Herrera	6	0	56	9
Rio Grande	N. M.-Tex.	Garfield	8	0	800	21
Riverton	Wyoming	Dry Creek	20	0	156	39
Riverton	Wyoming	Midwest Draw	14	0	348	59
Shoshone	Wyoming	Frannie Canal	5	3	292	28
Yakima	Wash.	Peterson Creek	13	0	744	70
Yakima	Wash.	Little Creek	11	6	100	24
Yakima	Wash.	Tucker Creek	11	6	71	19
Yakima	Wash.	Big Creek	12	6	100	24
Yakima	Wash.	Cle Elum Creek	12	0	500	118
Yakima	Wash.	Spexarth Creek	12	0	336	55
Yakima	Wash.	Nelson Creek	12	0	360	53
Yakima	Wash.	Sneep Dip Canyon	11	2	536	112
Yakima	Wash.	Dry Creek	11	2	1,636	47
Yakima	Wash.	Little Dry Creek	11	2	415	30
Yakima	Wash.	Hayward Canyon	11	2	525	152

Novel Track Construction in Experimental Service

Three Railways Try Foreign Design Having Rails Bolted to Tie-Plates—Special Joint Construction

A RAIL-FASTENING system in which the rails are bolted only to the tie-plates and these plates are attached to the ties by screw-spikes is the main feature of a type of track construction which has been developed in Germany and is being tried in this country. Its design is shown in the illustrations herewith. Tie-plates secured to the ties independently of the rail fastenings are used on some American railways, but in all such cases the rail is attached directly to the tie by cut spikes or screw spikes. The purpose of the independent fastening is to make the plate an integral part of the tie and thus avoid any motion, with resultant noise and wear, between the plate and the tie.

Heavy Tie-Plates—Taking first the tie-plate of this new track construction, as shown in Fig. 2, it is of rolled steel, $14\frac{1}{8}$ x $6\frac{3}{4}$ in., with a thickness of 53/64 in. to 19/32

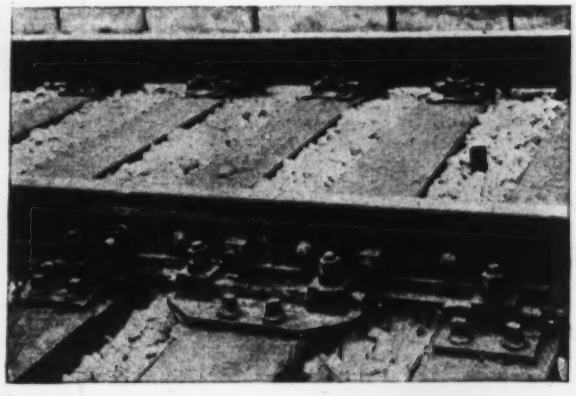


FIG. 1—NOVEL TRACK DESIGN
Rails are bolted to tie-plates attached to ties by screw spikes. Note supported joint with large base plate.

in. under the rail seat, which is inclined 1 in 40. The plate is flat-bottomed and is fastened by four screw-spikes about 6 in. long under the head. Its weight is about 21½ lb. The rail is seated between two heavy ribs or shoulders of rectangular section, about 1 x 1¼-in., which hold the heads of the bolts. This design may be compared with the double-shoulder plate of the Pennsylvania Railroad for 140-lb. rails, which is 7 x 14 in., with a thickness of 51/64 in. under the rail and a weight of 18 lb. The plate is flat-bottomed, but its rail seat is level and it has lighter shoulders of the usual section.

Double-shoulder tie-plates are not common, however, in American practice, the more general plan being to have a shoulder or rib only on the outer side of the rail, to resist the lateral thrust and thus relieve the spikes from this pressure and consequent wear. Notable large single-shoulder tie-plates are the 8x13-in. 22-lb. plates for 130-lb. rails on the Norfolk & Western Railroad and the 8x13½ in. 21½-lb. plates for 136-lb. rails on the Lehigh Valley Railroad. In both of these the maximum thickness is 29/32 in. at the rail seat, which has an in-

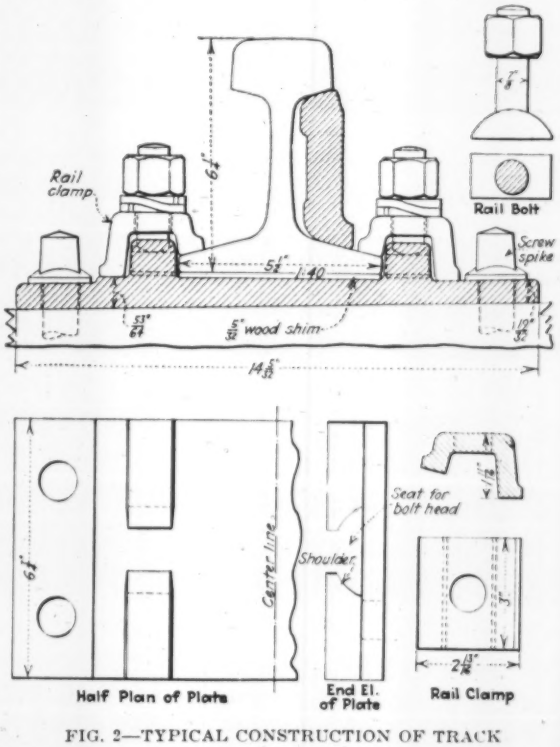


FIG. 2—TYPICAL CONSTRUCTION OF TRACK

clination of 1 in 20, while the bottom has diagonal ribs of ¼-in. height to bite into the wood. The purpose of these large and heavy plates is to distribute the pressure over such an area as to prevent cutting or crushing of the wood and at the same time to have sufficient stiffness to prevent buckling under load, thus insuring uniform distribution of the load over the entire surface covered by the plate. Numerous railroads have tie-plates 7x11 in. to 8x12 in., weighing 12 to 18 lb. each.

In the new German track design, a thin shim or plate of compressed wood is placed under the rail as a cushion between the metallic surfaces. This practice is common in Europe. Such shims, of treated but not compressed wood, have been tried in this country and have been generally unsatisfactory, owing to the heavy wheel loads.

Rail Fastening—In this feature the new track has a

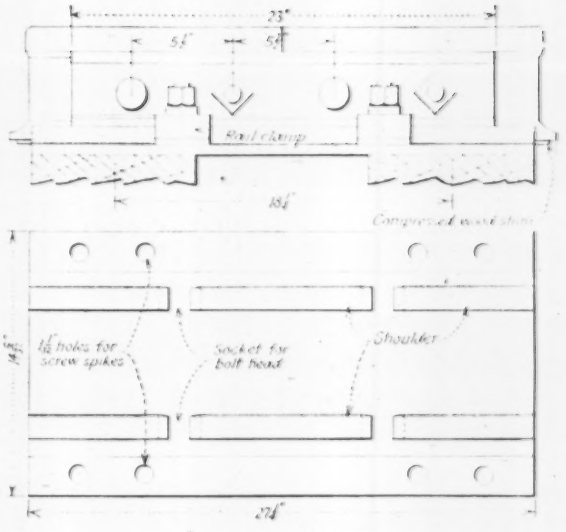


FIG. 3—SUSPENDED JOINT

radical departure from general practice, in that the rail is secured only to the tie-plate instead of to the tie. Each of the heavy shoulders of the plate has an undercut slot to form a seat for the T-head of a short ⅞-in. bolt, this head having a curved bearing against the lug (see Fig. 2.) Over the stem of the bolt is fitted a rail clip or clamp of inverted U-shape, having one short leg to bear on the rail base and a longer leg to rest upon the surface of the tie-plate. This clamp, 3 in. long, is held down by the nut and a heavy double-coil spring washer is placed between the nut and clamp. In combination, therefore, the rail is fastened to the tie-plate by two bolts, and the plate is fastened to the tie by four screw-spikes.

Rail Joints—Base support at the rail joints is provided by special plates which are similar to but larger than the tie-plates. For a two-tie suspended joint (Fig. 3), with ties spaced 18¼ in. c. to c., the plate is 14⅛ in. wide and 27¼ in. long, extending over the full width of each tie. Its weight is about 90½ lb. It is secured to each tie by four screw-spikes, but there are only two attachment bolts to each rail. Splice bars of fishplate or anglebar section may be used, the latter having the flanges slotted to clear the bolted clips.

For a three-tie supported joint (see Fig. 1), with middle and shoulder ties spaced 16⅞ in. c. to c., the base plate is about 16 in. long (projecting beyond the 8-in. width of the middle tie) and 14 in. wide, having its shoulders slotted for four attachment bolts, or two for each rail end. The bolts are 5½ in. from the rail-ends, or 11 in. c. to c., the splice bars being relied upon to hold the rail ends rigid.

This track design is now the standard for main lines of the state railways of Germany, on which it is said to be laid for about 6,500 miles, while in other countries of Europe it aggregates about 200 miles. In this country three experimental lengths have been laid as follows: 1 mile on the Illinois Central Railroad, with 110-lb. rails; 1 mile on the Missouri Pacific Railroad, with 90-lb. rails, and two ½-mile sections on the New York Central Railroad with 105-lb. rails. Its introduction is in the hands of the American Geo Co., New York, which is reported to have made arrangements with steel mills for the production of the material.

1,500-Ft. Cableway Handles Concrete on Wilkes-Barre Multiple-Arch Bridge

Steel Truss Falsework Centering Adjustable for Three Different Span Lengths and Rises—Long Structure Built in Two Longitudinal Sections to Maintain Traffic

By P. W. Ennis

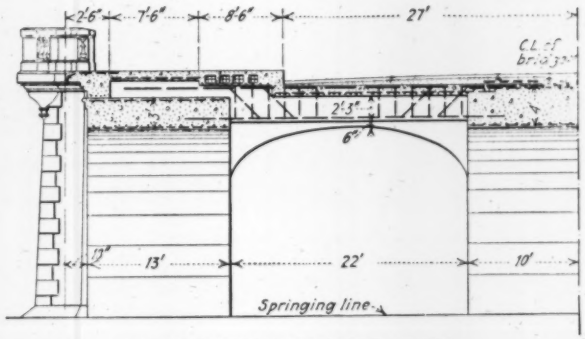
Resident Engineer, Market Street Memorial Bridge, Wilkes-Barre, Pa.

A 1,500-FT. cableway that handled 5-cu.yd. buckets of concrete, form panels and steel centering, and the use of steel truss centering designed so as to be adjustable to 82-ft., 100-ft., 110-ft. and 120-ft. spans, were construction features of the Market Street memorial bridge, recently built across the North Susquehanna River between Wilkes-Barre and Kingston, Pa. The first bridge built at this site, a covered wooden structure of four 175-ft. triple wooden trusses, resting on rockfilled timber cribs, was completed in 1825. In 1893 the original bridge was replaced with a steel truss structure, using part of the old cribs as foundations. The new memorial bridge replaces the steel structure.

Increase in traffic made the new bridge imperative, as but one other bridge connects Wilkes-Barre and Kingston. This is known as the North Street bridge, and accommodates but two lanes of traffic and one narrow sidewalk. The old Market Street bridge had two lanes for vehicular traffic, double streetcar tracks on one lane as a gantlet and one sidewalk. Frequently floodwaters submerged the Kingston approaches to both these structures, requiring a 10-mile detour to get from one city to the other.

Conditions demanded that traffic be maintained during construction of the new bridge. This was accomplished by extending the old bridge piers and moving the old structure upstream far enough to clear half the width of the new bridge. This half was then built, traffic turned on to it, and the old bridge dismantled and the second half of the new bridge completed. This procedure was estimated to increase the cost of the project $70,000 and delayed completion a full year.

Design—The new bridge is a reinforced-concrete structure of twelve arch spans, 1,270 ft. between abutments and having a net waterway opening of 1,150 ft., an increase of about 450 ft. over the previous structure. As a flood-control measure, the new structure is designed to permit dredging under the land span to increase the width of the existing waterways, which is but 700 ft. The grades of the Wilkes-Barre approach have been raised above the maximum known flood level. Four lanes of vehicular traffic, two lanes of combination trolley and vehicular traffic and two 17-ft. sidewalks are accommodated on the new bridge.



CROSS-SECTION OF RIVER SPANS

The twelve arch spans are arranged in the following order, starting from the Wilkes-Barre abutment: one 50-ft., one 100-ft., one 110-ft., four 120-ft., five 82-ft. The 50-ft. and 82-ft. spans are land spans and consist of barrel arches with solid spandrel walls. The deck slabs are supported by bearing walls on the barrels except at the crown of arches, where a shallow fill of 1:5:10 concrete was placed between the crown and the road slabs. The long spans, all over water, consist of three ribs each, the two outside ribs having a crown section 3 ft. deep and 13 ft. wide and the center rib having a

MARKET STREET MEMORIAL BRIDGE, WILKES-BARRE, PA.

crown section 4 ft. deep and 20 ft. wide. A clear width of 22 ft. separates the ribs. On the rib spans the deck is carried on reinforced-concrete beams, in turn supported either by the ribs direct or by benchwalls.

In building the bridge in two longitudinal halves the division was made on the center line of the structure which bisects the center rib. All reinforcing in the piers, abutments, and barrel arches was lapped across the center construction joint, but this procedure was not followed on the center ribs of the river span, because of the shearing action set up between the ribs, caused by deflection incident to construction of the second half. In routing traffic over the completed first or south half of the bridge, westbound vehicular traffic shared the permanent eastbound trolley-track lane with westbound trolley traffic. Eastbound trolley traffic was carried on a temporary track placed on short ties bolstered on the completed pavement next to the south curb, and eastbound vehicular traffic used the space between the permanent and temporary tracks.

STEEL TRUSS ARCH CENTERS
Note Cableway and Concrete Hoppers on Span.

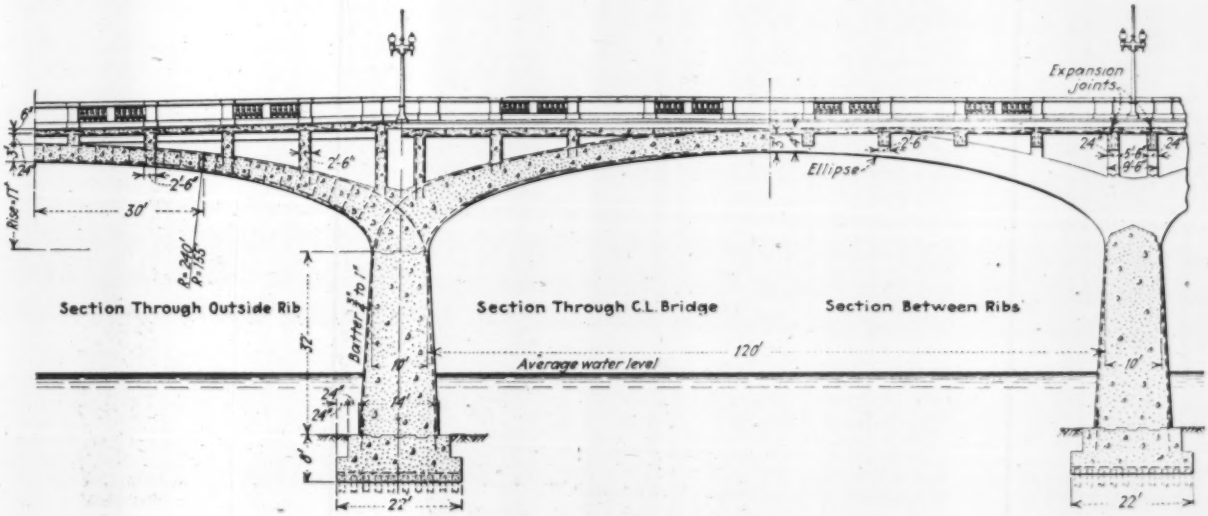
Foundations—Wooden foundation piles were used in all footings except the two abutments and the north half of the land piers 10 and 11. The cofferdam for all foundations except the two abutments, where wood sheeting was used, consisted of steel sheetpiling. To assist in stabilizing the piers and to prevent any possibility of excessive scouring under the footings, wherever possible under the river piers 12x12-in. timbers were driven as sheetpiling on the lines specified for the outside rows of foundation piling, driven side by side except where the cofferdam bracing interfered. These timbers were 28 ft. long, with every third pile 40 ft. long. In addition to the outside rows of sheeting, diaphragm walls of the same length timbers were driven across the cofferdam (parallel to center line of bridge) at the center and quarter points in the cofferdam length, three diaphragm walls for a complete pier foundation. This timber sheeting was used on piers 1, 5, 6 and 7, and on the north half of pier 4.

On the remaining river piers after the steel sheetpiling had served its purpose as cofferdam, it was driven down to the top of the footing to protect the piers from scour.

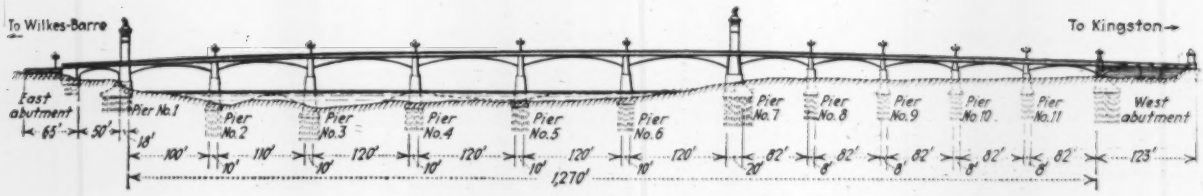
Stiff-leg derricks, set up to reach two piers, drove all cofferdam and foundation piling. For the river piers the derricks sat on falsework piles. Derrick boats assisted in driving the river-pier piling. Wooden foundation piles were driven to a maximum penetration rate of 100 blows per foot for the last five blows with a hammer rate of 140 or more blows per minute, each blow rated at 8,200 ft.-lb. with the type of hammer used.

It was possible to pump all cofferdams dry for the placing of concrete except on pier 3 and the north half of piers 2 and 4. Concrete of 1:2:4 mix was tremied for the seal of these cofferdams, the tremie pipes being handled by derricks. Concrete for the dry footing was a 1:3:5 mix.

In the tremied footings the bottom reinforcing mat



TYPICAL SECTIONS OF 120-FT. SPANS

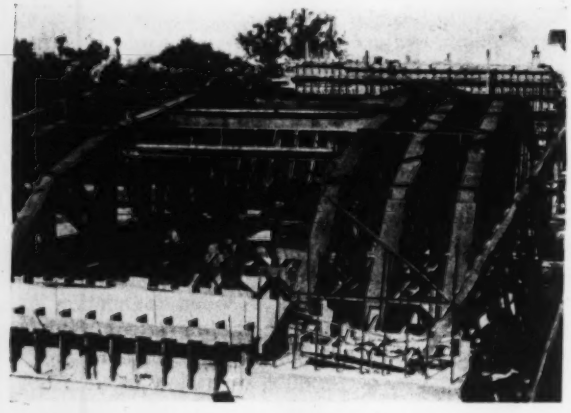


ELEVATION, MARKET STREET BRIDGE

was placed just above the seal. Although the plans called for two 4-ft. lifts for each footing, it was necessary in some cases to increase the depth of the bottom lift to as much as 10 ft.

Floods overtopped the cofferdam on several occasions during foundation construction, but no serious damage resulted other than the delay in holding up work and the expense of pumping out.

The foundations for the retaining walls of the east and west plazas were formed, in cases where the main wall footing did not rest in solid gravel, by reinforcing



STEEL ARCH CENTERS

the main footing with pedestals carried to a solid gravel bottom. The soil pressure of these pedestal footings was equalized to some extent by placing the toe, where necessary, 3 ft. to the front of the main footing.

Steel Truss Arch Centering—An ingenious arrangement of steel trusses was used for the arch centering, adjustable to varying length spans of 82, 100, 110 and 120 ft., with corresponding rises of 12, 15, 16 and 17 ft. Four panels, totaling 38 ft. 3 in., at each end of the trusses were framed as a unit. Bolting the two units together provided a truss for the 82-ft. span. By inserting two, three or four 10-ft. panels between two end units, the trusses were lengthened for the longer spans as desired. The adjusting panels had bolted connections, and although the amount of camber to allow for had been accurately calculated, in actual practice it was found that the amount of deflection was indeterminate, depending on the tightness of the bolted connections. Deflections of the two adjoining halves of the center rib varied as much as 2½ in. in some of the spans.

One set of three trusses was used under the outside ribs of the 100- to 120-ft. spans, and another set of three trusses was used for the longitudinal half of the center rib, each set being well crossbraced. Forms for the floorbeam spanning between the arch ribs were also carried by the trusses. The ends of each truss rested on two 20-in. I-beams that were placed in and extended through the piers. To help offset the unbalanced loading due to the arches on one side of a pier being poured first, timber bents were placed under the projecting I-beams, resting on the pier footings. On the 82-ft. barrel-arch spans five trusses evenly spaced were used for each of the longitudinal halves.

Construction Plant—The feature of the construction plant was a 1,700-ft. cableway which handled concrete, forms, reinforcing and the steel trusses. This cableway consisted of a 2¼-in. steel cable suspended from two steel towers 115 ft. high, located behind each abutment so situated that the cable was directly over the curb line of the bridge. After completing the south half of the bridge the cableway was shifted to a similar position covering the north half. The cableway was operated by a steam engine.

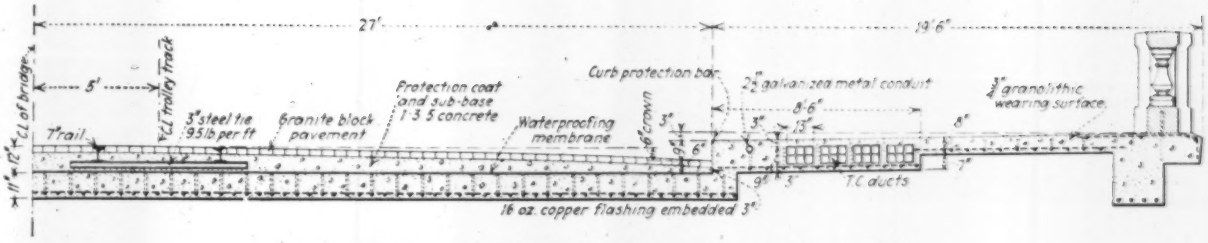
All concrete was mixed in a central mixing plant located on the west side of the river south of the bridge. Gravel, sand and cement were brought to the plant in cars switched over the trolley tracks. Sand and gravel were dumped into hoppers under the track and transferred to the mixer bins or to storage piles by a stiff-leg derrick. The mixing plant contained one 2-yd. mixer, which dumped directly into 4-cu.yd. buckets set on a flat car. The concrete buckets were run out under the cableway on the flat cars and picked up by the cable hoist through openings left in the bridge in span 10. The flat cars conveying the buckets to and from the mixer were operated by a cable.

Concrete was dumped from the 4-yd. cableway buckets into hoppers and was conveyed to final position in the forms by chutes. Concrete was placed in this way at the rate of 30 to 45 cu.yd. per hour.

Granite Trim and Composite—A considerable quantity of Chelmsford granite was used in the construction of architectural features. The entire balustrade, the coping of the east plaza, the facing of the east and west plaza walls and stairway walls, all of the four large and two

COMPLETING SECOND HALF OF BRIDGE

Note temporary streetcar tracks on completed deck near left curb. Crane in foreground is erecting one of pylons.



CROSS-SECTION OF ROADWAY AT CENTER OF RIVER SPANS

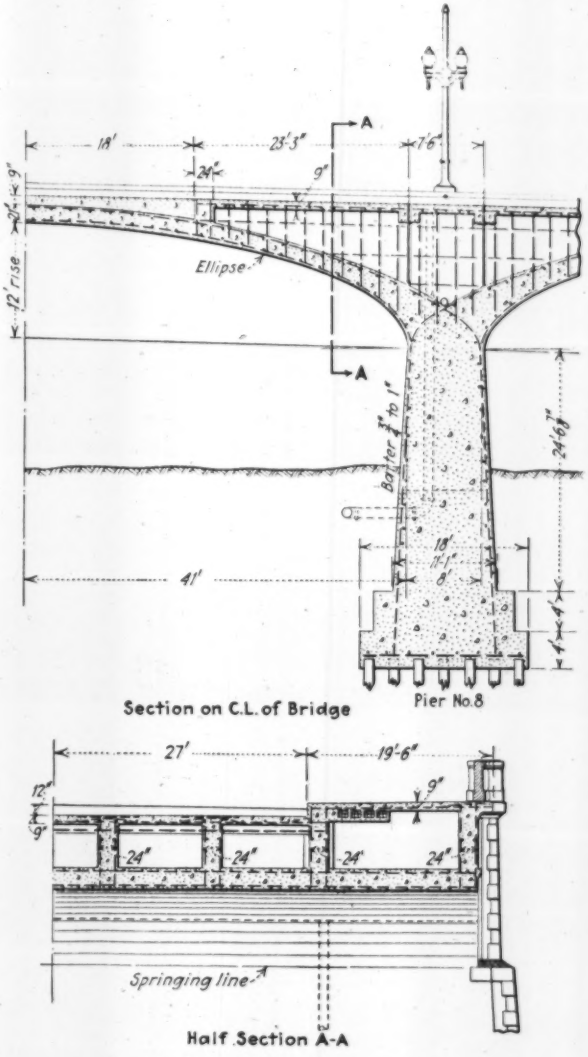
small pylon bases, the two obelisk bases, all the pier noses and the ice breakers were of granite. The ornamental features above the balustrade were of bedford limestone. All conspicuous concrete surfaces not granite-faced, other than sidewalks and roadways, such as arch faces, soffits and faces of barrel arches, spandrel wells, benchwall ends, facia walls, beams and copings, sides and ends of land piers and abutments, were faced with a 2-in. thickness of granite composite. This composite is a mixture of granite chips and stone dust made into mortar by adding one part in four of cement and the necessary water, and was placed against the face forms at least 2 in. in thickness.

The granite composite was at first placed with the aid of facing irons. Reinforcing steel and fastenings, however, made this method impracticable, so the composite was then placed in front of ½-in. galvanized-wire mesh fastened in front of temporary vertical rods so wired to face form as to be easily removed. On flat surfaces and on a large part of the arch soffits the composite was placed directly on the forms as required and the concrete poured directly on the facing. Care had to be taken in placing the composite to make it homogeneous, else the concrete would stain through the facing.

After the facing had sufficiently cured, the surface was bush-hammered. By maintaining the proper size and percentage of granite chips, the facing produced a sparkling surface after brushing. It was found difficult, however, to match the facing to give a uniform color wherever patching was required on the surface. Experience showed that the joints in the composite facing should be straight and square-cut—in fact, the fewer joints used the better. The composite was placed and bush-hammered on this work for 26c. per square foot.

The roadway was paved with granite on a 1:4 cement sand cushion ½ in. thick on a 1:3:5 crowned concrete base separated from the road slab by two layers of waterproofing membrane and three layers of pitch. The granite blocks were cement-grouted, except at the expansion joints, where asphalt was used. The entire west approach was paved with asphalt on a bituminous concrete base and a portion of the east approach, the continuation of River St., was paved with asphalt on a concrete base.

Contractors and Personnel—David A. Keefe, Athens, Pa., succeeded the late Benjamin H. Davis as consulting engineer on the project. The writer was resident engineer and Spencer A. Stinson was assistant resident engineer for the consultants. Carrere & Hastings, architects, New York, had the design and care of the architectural features of the bridge, represented on the job by Frank Logan. Walter S. Rae, Pittsburgh, was general contractor on the project.



SECTIONS OF 82-FT. SPAN

Welding Used Extensively in Albany Building

Arc welding is being used in constructing a new service building now being erected by the New York Power & Light Corporation in Albany, N. Y., not only for joining the framework and roof trusses but also on the roof itself and on a large part of the steam piping. About 700 tons of steel will be used in the structure, which will be 375x198 ft., partly single story and partly multi-story in design. Completion is expected by Sept. 1, 1930. The roof will be made of sections of shaped steel resembling corrugated forms, which will be welded in interlocked positions and covered with the usual type of roofing material. Steel steam pipe above 2 in. in diameter will be joined by welding also.

Relative Values in Five Classes of Utility Systems

By C. F. Lambert

Burns & McDonnell Engineering Co., Kansas City, Mo.; Los Angeles, Calif.

THIS article brings up to date of Jan. 1, 1930, the values of five groups of public utilities, as shown annually in *Engineering News-Record* since the first article in May 7, 1925. A more extended review was given April 18, 1929. In these values, figures for 1913 are taken as 100 per cent. Curve No. 1 shows the relative yearly value of power plant buildings, and separately of labor and material in the proportion in which each enters into the cost of a power plant building or pump station. Curve No. 2 and Table I show the yearly value and five- and ten-year averages for water-works systems. These figures are based on 25 systems in various parts of the United States, and on 68 separate items going to make up the total. Curve No. 3 and Table II show the same information for electric light plants. These figures are based on 25 systems, and on 84 separate items going to make up the total. Curve No. 4 and Table III show the same information for street railway systems, these figures being based on ten systems and 82 separate items. Curve No. 5 and Table IV, for natural gas systems, are based on 15 systems and 58 separate items. Curve No. 6 and Table V, for artificial gas systems, are based on 25 systems and 63 separate items. Curve No. 7 shows the relative value of the five different utilities.

Recent government figures show relative values based on 1926 values as 100 per cent. For this reason Table VI has been prepared, giving 1913 and 1923 to 1929 values on this basis.

RELATIVE YEARLY VALUES OF MAIN ITEMS IN PHYSICAL VALUE OF FIVE CLASSES OF PUBLIC UTILITIES—1913 FIGURES = 100

Table I—Water-Works Plants

	1913	1923	1924	1925	1926	1927	1928	1929
Land	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Building	11.2	20.8	20.7	20.6	20.7	20.2	20.1	20.4
Equipment	12.1	22.9	23.0	22.9	22.7	22.5	23.0	23.2
Distribution	72.7	149.8	152.2	143.2	140.5	127.5	123.8	131.8
Miscellaneous	1.1	2.2	2.0	2.1	2.0	1.9	1.9	1.9
Total	100.0	198.6	200.8	191.7	188.8	175.0	168.8	180.2

Table II—Electric Light Plants

	1913	1923	1924	1925	1926	1927	1928	1929
Land	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Buildings	10.1	18.8	18.6	18.5	18.6	18.2	18.2	18.5
Equipment	38.9	73.4	73.5	73.6	73.0	72.0	72.9	73.4
Distribution	44.8	70.4	69.6	70.9	71.2	71.1	72.9	75.8
Miscellaneous	3.4	6.2	6.1	6.1	6.0	5.7	5.6	5.6
Total	100.0	171.6	170.6	171.9	171.6	169.8	172.4	178.1

Table III—Street Railway System

	1913	1923	1924	1925	1926	1927	1928	1929
Land	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Buildings	4.7	8.8	8.7	8.6	8.6	8.5	8.5	8.6
Track const.	64.3	113.6	112.8	110.2	110.2	108.6	108.5	106.9
Span const.	5.8	8.7	8.8	8.1	8.0	8.1	8.4	8.7
Cars and equip.	20.9	47.0	42.9	40.7	40.7	40.7	39.9	39.9
Miscellaneous	1.7	3.3	3.2	3.2	3.2	3.1	3.0	3.0
Total	100.0	184.0	179.0	173.4	173.3	171.6	170.9	169.7

Table IV—Natural Gas Plants

	1913	1923	1924	1925	1926	1927	1928	1929
Land	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Buildings	1.6	2.9	2.9	3.0	3.0	2.9	2.9	2.9
Equipment	1.7	3.1	3.1	3.0	3.0	3.0	3.0	2.9
Distribution	92.2	168.7	173.2	175.0	174.6	169.9	170.3	171.1
Miscellaneous	2.9	5.9	5.7	5.5	5.4	5.3	5.2	5.2
Total	100.0	182.2	186.5	188.1	187.6	182.7	183.0	183.7

Table V—Artificial Gas Systems

	1913	1923	1924	1925	1926	1927	1928	1929
Land	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Buildings	6.8	12.6	12.5	12.4	12.5	12.2	12.1	12.4
Equipment	30.4	63.4	61.2	60.5	60.6	60.3	59.4	58.7
Distribution	56.5	107.5	108.6	107.3	106.7	101.5	101.0	103.8
Miscellaneous	2.1	4.2	4.0	3.9	3.8	3.8	3.7	3.7
Total	100.0	191.9	190.5	188.3	187.8	132.0	180.4	182.8

TABLE VI—RELATIVE VALUES BASED ON 1926 AS 100 PER CENT

Water-Works

	1913	1923	1924	1925	1926	1927	1928	1926
Land	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Buildings	5.9	11.0	11.0	10.9	11.0	10.7	10.6	10.8
Equipment	6.4	12.1	12.2	12.1	12.0	11.9	12.2	12.3
Distribution	38.6	79.3	80.6	75.8	74.4	67.5	65.6	69.8
Miscellaneous	0.6	1.2	1.1	1.1	1.1	1.0	1.0	1.0
Total	53.0	105.1	106.4	101.4	100.0	92.6	90.9	95.4

Electric Light Plants

Land	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Buildings	5.9	10.9	10.8	10.8	10.8	10.6	10.6	10.8
Equipment	22.7	42.8	42.8	42.9	42.5	41.9	42.5	43.9
Distribution	26.1	41.0	40.5	41.3	41.6	41.4	42.5	44.2
Miscellaneous	2.0	3.6	3.6	3.6	3.5	3.3	3.3	3.3
Total	58.3	99.9	99.3	100.2	100.0	98.8	100.4	103.8

Street Railways

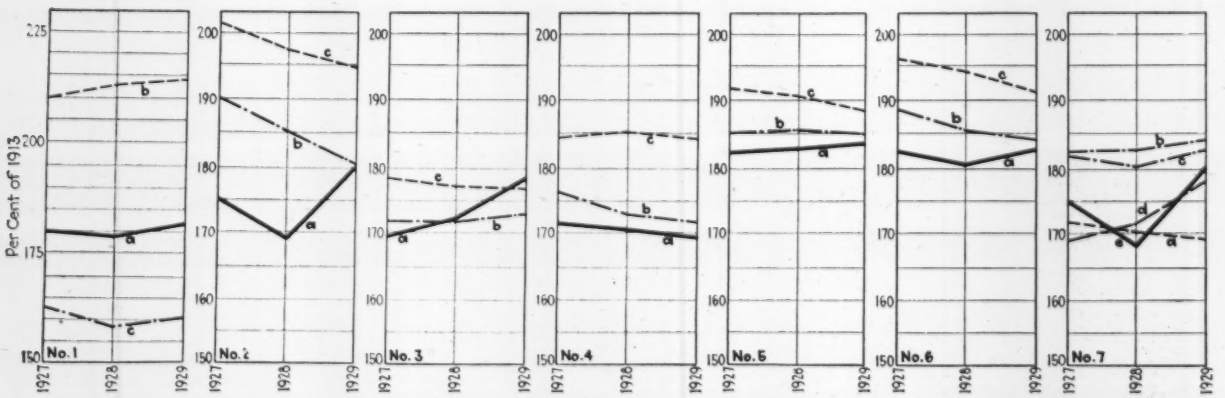
Land	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Buildings	2.7	5.1	5.0	5.0	5.0	4.9	4.9	4.9
Track const.	37.1	65.5	65.1	63.6	63.6	62.7	62.6	61.7
Span const.	3.3	5.0	5.1	4.7	4.6	4.7	4.8	5.0
Cars and equip.	12.1	27.1	24.8	23.5	23.5	23.5	23.0	23.0
Miscellaneous	1.0	1.9	1.8	1.8	1.8	1.8	1.7	1.7
Total	57.7	106.1	103.3	100.1	100.0	99.1	98.5	97.8

Natural Gas Plants

Land	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Buildings	0.9	1.5	1.5	1.6	1.6	1.5	1.5	1.5
Equipment	0.9	1.7	1.7	1.6	1.6	1.6	1.6	1.5
Distribution	49.1	89.9	92.3	93.3	93.0	90.6	90.8	91.2
Miscellaneous	1.5	3.1	3.0	2.9	2.9	2.8	2.8	2.8
Total	53.3	97.1	99.4	100.3	100.0	97.4	97.6	97.9

Artifical Gas Plants

Land	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Buildings	3.6	6.7	6.7	6.6	6.7	6.5	6.4	6.6
Equipment	16.2	33.8	32.6	32.2	32.3	32.1	31.6	31.2
Distribution	30.1	57.2	57.8	57.1	56.8	54.0	53.8	55.3
Miscellaneous	1.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0
Total	53.2	102.1	101.4	100.2	100.0	96.8	96.0	97.3



No. 1 Power Plants
a. Building cost.
b. Building labor.
c. Building material.

No. 2 Water-Works
a. Yearly value.
b. 5-year average
c. 10-year average

No. 3 Elec. Lt. Plants
a. Yearly value.
b. 5-year average.
c. 10-year average.

No. 4 Street Rys.
a. Yearly value.
b. 5-year average
c. 10-year average.

No. 5 Natural Gas
a. Yearly value.
b. 5-year average.
c. 10-year average

No. 6 Artificial Gas
a. Yearly value.
b. 5-year average.
c. 10-year average.

No. 7
a. St. rys. b. Nat. gas.
c. Artificial gas.
d. Elec. light.
e. Water-works.

Construction Methods for Securing Pavement Smoothness

Smoothness Calls for Construction Refinements Often Unimportant for Strength and Durability—Curb Joints, Manholes, Crosswalks and Intersections Require Specific Attention

By Arthur W. Consoer
Consoer, Older & Quinlan, Consulting Engineers, Chicago, Ill.

POPULAR demand for smoothness in pavements, particularly for city streets, has been insistent for some years. Engineers recognize roughness as a factor that may endanger the structural integrity and life of the pavement by introducing unnecessary impact stresses. Prof. T. R. Agg has shown also that roughness may materially increase the tractive resistance of vehicles and thus increase what may be called the operating cost of the road or street. There is reason enough, therefore, for every effort, consistent with ultimate economy, to control the smoothness factor in pavement construction.

The ideal of smoothness would of course be a pavement the surface of which, except for texture, would not vary at any point or at any time from the established grade and crown. This ideal has never been attained, although the best present-day paving practice, with improvements in passenger car design, have resulted in a degree of smoothness that has somewhat stilled public criticism of the riding qualities of most of the newer pavements. Means for increasing pavement smoothness include many construction details.

Subgrade Construction—The subgrade merits primary consideration. The claim is often made by contractors that while the pavement, as finished, conformed to the required standard, yet a day or week later it is found not so to conform. It is well known that clay soils may be compacted to varying degrees by rolling, tamping or traffic; that the amount of compaction may vary with the moisture content, and that the rolled grade may again expand or swell upon the addition of moisture. It follows that if the subgrade is not uniformly compacted, or if low places are filled with loose material, it will not swell uniformly upon absorption of moisture from the fresh concrete and an uneven surface may result.

Lightly sprinkling the subgrade just before placing the concrete has not proved effective to prevent this action, and in fact there is reason to believe it may accentuate the trouble. The swelling seems to continue for some hours after the apparent surplus water has been absorbed and even after the concrete has started to set. It is believed that this uneven subgrade swelling is responsible for surface unevenness in some cases and that it is the most conspicuous cause of check cracks or hair cracks. To eliminate this factor in so far as may be feasible, the following precautions may be taken in subgrade construction for concrete paving or concrete bases:

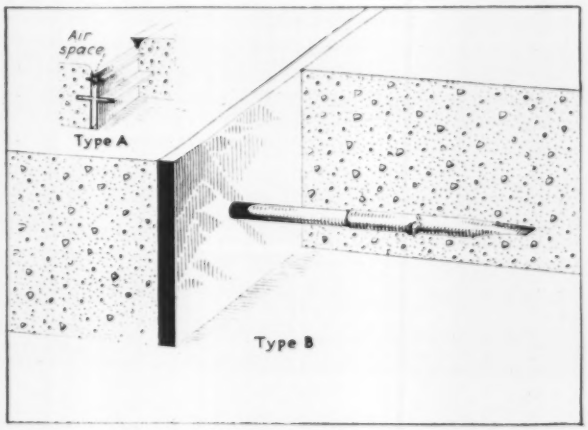


FIG. 2—SLIP DOWELS FOR TRANSVERSE EXPANSION JOINTS

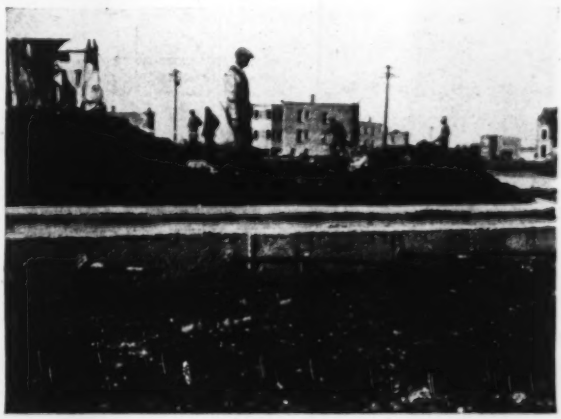


FIG. 1—TIGHT DOWEL FOR SLAB AND CURB JOINT

Complete all rolling at least twelve hours prior to placing concrete. Swell the subgrade after rolling by saturating for at least twelve hours before concreting; to accomplish this result in dry weather, it may be necessary to wet the soil thoroughly three or four nights in succession. Prohibit the filling of low places with loose material after rolling and saturation. Permit only such traffic over the subgrade after rolling and saturation as may be absolutely necessary, and require this to be distributed uniformly. Industrial railway haul with the mixer at one side off the subgrade is ideal, but not always feasible. A uniform water content for all batches is necessary. The suggestion has been made that by covering the subgrade with a layer of tar paper or asphaltic felt before placing the concrete, some of the difficulty with swelling will be eliminated.

Surface Finishing—On concrete paving, where crown and width are uniform, finishing machines may produce

FIG. 3—CROSSWALK DESTROYS TWO TRAFFIC LANES

excellent results in the hands of skilled operators. Even the most skilled machine operator, however, cannot alone produce the best results. The side forms must be straight, be set truly to line and grade and be rigidly supported in that position throughout the operation of finishing. The forms should be thoroughly cleaned just ahead of the mixer. The consistency of the concrete must be uniform and dry enough not to slump excessively, especially on grades. A balance between workable consistency and the stiffness required to avoid slumping on steep grades is not easy to strike. Soft batches may cause the crown to slump and the haunches to bulge, even on flat grades.

In street paving work where the crown must be varied

FIG. 4—INTERSECTION WITHOUT CROSSWALK HUMPS

in order to secure proper gutter drainage to inlets, finishing machines are not often used and the results are wholly dependent upon the care and skill of the spreaders and finishers. Hand strike-off screeds moved longitudinally are of but little value in producing smoothness except as aids to vision. The use of a light straight-edge transversely is helpful in removing laitance and improving smoothness.

Skilled spreaders guided by frequent pins, supervised by a finisher having a trained smoothness vision and followed by competent finishers provided with light straight-edges and long-handled floats, offer a combination that can readily produce results almost equal to the best secured by other means. Longitudinal floats operated from bridges may aid skilled workmen, but they are not adequate substitutes for skilled spreaders and finishers. In hand as well as in machine work, a uniform and plastic but not sloppy concrete is essential for smoothness.

There are many firm advocates of special finishing tools, but ordinarily such tools are of value only in the hands of those skilled in their use, and in the last analysis it is the trained eye of the expert workman aided by the straight-edge that produces the results where finishing machines cannot be used. Excessive tamping or excessive finishing will result in scaling of the surface and sometimes in serious disintegration of the surface.

For concrete paving where smoothness is desired, it is important, therefore, that engineers not only determine the financial responsibility, experience and plant of the bidders but also investigate the quality of finishing to be expected from the workmen in the organizations of the contractors.

Control and Inspection—The diligent use of a 10-ft. straight-edge by the inspectors on the morning following construction is an excellent way to promote smoothness in concrete pavements. Where high or low spots are found which deviate more than $\frac{1}{4}$ in. from the 10-ft. straight line, it is probably better to penalize the contractor for such high and low spots on a yardage basis, as is now the practice of most state highway departments, than to require the contractor merely to rub down high spots. Vigorous use of the penalty clause will usually eliminate most of the roughness in the pavement.

With asphalt or brick wearing surfaces also this same diligent use of straight-edges by the inspectors will usually produce a marked improvement. The practice of employing very thin sand or sand-cement cushions for brick wearing surfaces will yield a smoother surface than the 2-in. cushion used generally a few years ago. Considerable variation in the thickness of the sand or sand-cement cushion, due either to avoidable roughness in the top surface of the concrete base or to lack of care in spreading the cushion itself, will detract from the smoothness of the finished brick pavement. With hot-mixed asphaltic wearing surfaces, aside from the need for careful supervision of the spreading, raking and rolling operations, which should be controlled by the constant use of a straight-edge, probably the greatest factor in promoting smoothness is careful technical control of the asphaltic mixture at the asphalt plant, so as to minimize rolling, rutting, cracking, bulging and creeping of the wearing surface. In spreading asphaltic mixtures care should be taken to spread with rakes or shovels or forks the entire contents of each load dumped.

What has been said about the need for expert workmanship in finishing concrete pavements applies similarly to the work of laying asphaltic or brick or stone block wearing surfaces.

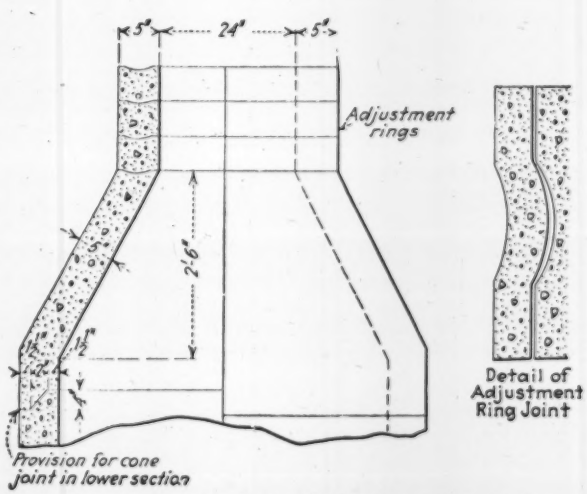


FIG. 5—MANHOLE WITH PRECAST CONE AND ADJUSTMENT RINGS

Expansion and Curb Joints—Poor expansion joints or the lack of joints frequently result in distortion of the pavement surface. The importance of proper expansion joints was explained in an article by Clifford Older in *Engineering News-Record*, Oct. 6, 1929, p. 530.

Where slip or sleeve dowels are not employed across joints and the asphaltic expansion joint is not installed in a truly vertical position, one slab of concrete will usually slide upward because of the beveled joint and introduce a decidedly rough spot. The use of slip dowels is helpful in preventing such unevenness. Two types of slip dowels used with considerable success for paving work in suburban towns in the Chicago metropolitan area are shown in Fig. 2. Constant and proper maintenance of expansion joints so as to preserve a smooth riding pavement is highly important.

Fig. 1 illustrates a satisfactory method of employing tight dowels to eliminate unevenness at the juncture of paving slab and curb and gutter. Where tight dowels are used, care must be taken to provide that expansion joints in the paving slab are continued on through the curb and gutter, as otherwise the doweling may interfere seriously with the expansion of the slab.

Observations with level and rod on completed curb and gutter and paving have shown that unevenness where the pavement slab adjoins a gutter flag is due not only to settlement of the gutter flag but frequently to a rise or curling upward of the edge of the pavement slab. The amount of such unevenness varies from time to time with changes in temperature and with changes in the moisture content of the subgrade.

FIG. 6—MANHOLE COVER WITH FLANGE

Intersections and Manholes — Proper design of intersections is essential for smoothness in street paving. In many municipalities there still exist examples of the pedestrian's steps or zero walks which were in favor with city officials before the steady flow of automobile traffic was so important a factor in the design of intersections. Many four-lane streets are reduced to two-lane streets because of these abominations. Fig. 3 illustrates the undesirability of this type of intersection, while Fig. 4 illustrates a recent intersection which combines convenience for the walking public and convenience for the riding public. Many streets can be easily widened for traffic by rebuilding the street intersections for the smooth passage of vehicles between curbs for the full width of paved roadway without inconvenience to pedestrians.

Numerous manhole and catchbasin covers and water-valve basins as well as covers for vaults installed by utility companies are serious causes of unevenness in city pavements. Settlement of the cast-iron covers of these structures is a common occurrence and merits far more attention than it has received. Annoyance to automobile traffic from this cause is particularly acute where the top of the structure has been adjusted to grade during the paving operations by placing one or more courses of brick masonry on the top of the structure to bring the cover to the top surface of the finished pavement. Such adjustments frequently do not stay put, but settle downward and disturb the smoothness of the paved street.

Concrete manholes and catchbasins of the type shown by Fig. 5 have been used with success in eliminating settlement of cast-iron covers within the paved area of city streets. In the adjustment to grade of such covers during paving operations, the concrete rings have caused less trouble than the customary adjustments with brick and cement mortar.

As a further precaution against settlement of cast-iron covers on street paving, a new type of lid has been developed with an upper outward flange, as shown in Fig. 6. This flange rests on the concrete of the paving and must shear through or crush that concrete before settlement occurs.

A frequent cause of lack of smoothness in pavement is the presence in the subgrade of recently backfilled trenches for tile drains from stormwater inlets or for service pipes to houses for gas, water or sewage. Where such trenches occur, the pavement should be thickened to bridge the weak area safely, or sufficient reinforcing steel should be placed in the bottom of the paving slab over the weak area to insure it against failure due to local settlement which may occur subsequently along the line of the trench.

Locating Soundings by Radio

How the hydrographic surveyor can accurately locate soundings at a considerable distance from shore by means of radio signals, even under unfavorable weather conditions, is described by Douglas L. Parkhurst, chief of the instrument division, U. S. Coast and Geodetic Survey, in an article in the June issue of *Electronics*. The method, in brief, consists in the firing of a small quantity of high explosive beneath the surface of the water at the point where the sounding has been made. Sound from this explosion travels through the water to submerged hydrophones at the shore, where it is transformed into radio waves, broadcast, picked up by a receiver aboard ship and recorded as a dot upon the face of a chronograph. The initial impulse has also been recorded on this face by means of a hydrophone at the ship, and the elapsed time is measured by a chronometer. The velocity of sound through seawater being known, distances from the ship to the shore hydrophones are easily computed and the ship's location plotted. Accurate measurements have determined that the velocity of sound through seawater is approximately 4,920 ft. per second, with a slight variation for temperature.

The system experiences much difficulty in some locations, the cause of which is not always apparent, and shoals are particularly troublesome. For proper results, the submerged hydrophones at the shore should be at least 50 ft. under water. They are sometimes anchored as much as 2 miles or more off shore, depending upon the character of the sea bottom. On the Atlantic coast, where the bottom falls away slowly and at a very even gradient from the shore, considerable difficulty has been experienced in getting the apparatus to work at any great distance. On the West coast, where conditions seem more favorable, excellent results have been achieved over distances of about 200 miles.

Holing Through a 6-Mile Tunnel on the Japanese Railways

By I. Takemata
Chief, Tokyo Construction Office, Japanese Government Railways

AN IMPORTANT event in the construction of the long Shimizu tunnel, on the Joetsu line of the Japanese Government Railways, was the holing through of the headings at 2 p.m. on Dec. 29, 1929. In the accompanying illustration the engineers from opposite sides are seen shaking hands in congratulation. The

MEETING OF HEADINGS, SHIMIZU TUNNEL
The two engineers in charge of the work on opposite sides are shaking hands.

methods of construction and progress of excavation were reported in *Engineering News-Record* of July 30, 1925. [A note of the holing through was given also in the issue of Feb. 27, 1930, p. 366.—Editor.]

This work has been watched with keen interest not only by railway engineers but also by the general public, on account of the importance of the tunnel for the inland traffic of Japan, its length of more than 6 miles, the hard rock with faults and cracks which the work had to go through, and, lastly, the big volume of water flow along the faults, which amounted to 12 sec.-ft. on the south side and 10 sec.-ft. on the north side.

In November, 1927, a big fault with much fault breccia was encountered on the south side, and water (about 11 sec.-ft.) gushed out from one spot. It was impossible to expect regular progress of work from the driving method then practiced—that is, a bottom-heading and top-cut system, with no separate water tunnel. Following this flooding, a drain tunnel, 7x7 ft. in section, was driven up to the water-bearing fault, some 9,000 ft. from the portal. It runs parallel to the main tunnel, 50 ft. away, and 4 ft. below the formation level or subgrade. Thus water was drained away and the heading was driven on smoothly, though slight dislocations were sometimes encountered.

In 1929 electrically operated mucking shovels were used for mucking on the south side. During November, 1929, the heading advanced 371 ft. and during December 420 ft. (both on the south side). This was thought remarkable progress. Unexpectedly, very hard rock appeared some distance from the meeting point of the headings and progress was somewhat delayed on both sides.

As the meeting of the headings was a significant event, it had been arranged that the last blasting should be done by signal from the Railway Minister through a siren installed at a point in the tunnel on the south side, which was to be sounded electrically by the Minister in his office in Tokyo. Thus, on Dec. 29, the tunnel was successfully driven through, as had been arranged, while the siren was giving the order of the Minister for the last blasting.

Santa Fe Railway Improves and Extends the Orient Line

Rebuilding 737 Miles of Old Lightly Built Line to Meet Modern Standards — Bridge Work — Extension to Mexico

RAILWAY improvement and reconstruction on a large scale is following the acquisition of the 737-mile line of the Kansas City, Mexico & Orient Railway by the Atchison, Topeka & Santa Fe Railway, as an addition to the 13,000-mile system of the latter. While the Orient line, an unfortunate enterprise, is of weak construction and had poor earnings as an independent railroad, it has strategic advantages and forms a logical supplement to the larger system, as will be seen by the map, Fig. 2.

As planned originally by the late Arthur Stillwell, the Kansas City, Mexico & Orient Railway was to extend from Kansas City, Mo., to the Pacific Coast port of Topolobampo, Mexico. Financial difficulties prevented

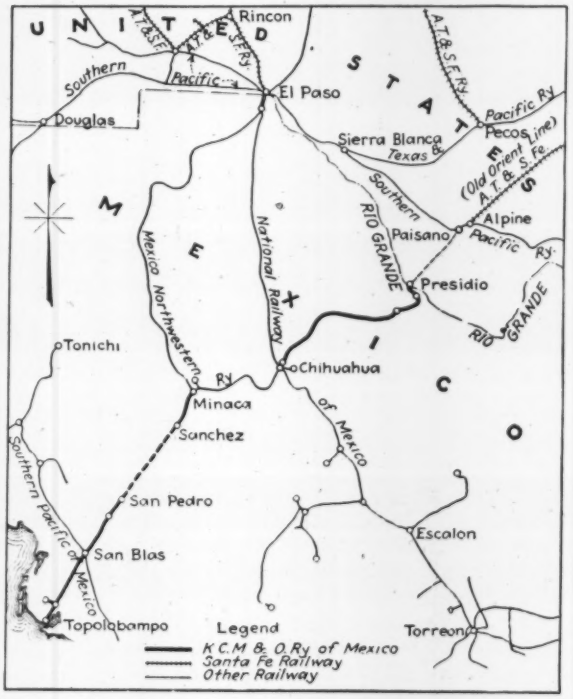


FIG. 1—KANSAS CITY, MEXICO & ORIENT RAILWAY OF MEXICO

this project from being completed, but the line was built eventually from Wichita, Kan., to Alpine, Tex., a distance of 737 miles. The Orient property also included three disconnected lines in Mexico (Fig. 1), aggregating 316 miles: (1) Topolobampo to San Pedro, 78 miles; Creel to La Junta, 74 miles, and Chihuahua to Ojinaga,

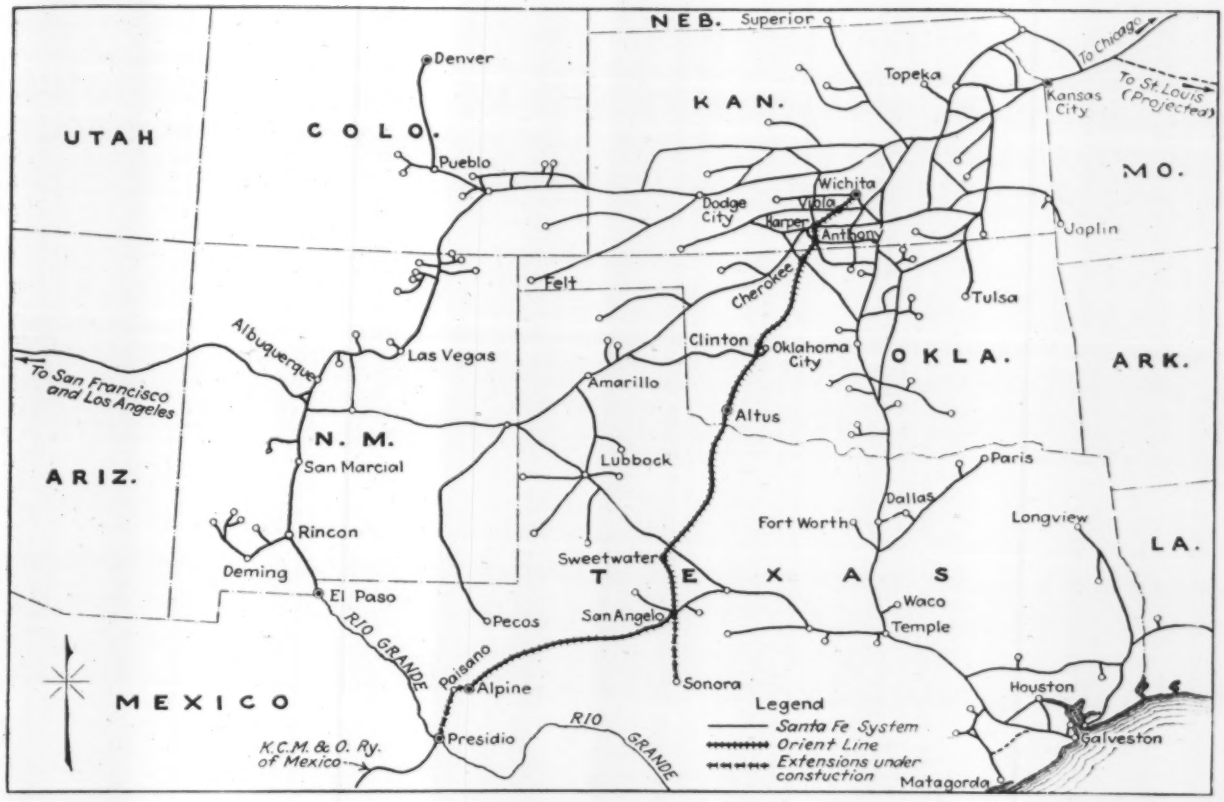


FIG. 2—CONSOLIDATED SYSTEM OF SANTA FE AND ORIENT RAILWAYS

164 miles. Between Chihuahua and La Junta the Mexico Northwestern Railway is used, but there is a 192-mile gap between San Pedro and Creel (or Sánchez). These Mexican lines, now in other hands and separated from the American portion of the line, are shown in Fig. 1.

Construction on the Orient line began in 1902 and was carried on at intervals until 1910, when additional funds could not be obtained. Since 1912 the properties have been in receivership, except for two years, and at times the abandonment of the line was threatened. In 1928, the Orient stock was sold to the Santa Fe, which has since sold the stock of the Mexican properties to B. F. Johnston, president of the Kansas City, Mexico & Orient Railway of Mexico.

The Orient Line—Built under continual financial difficulties, the track was laid with 70-lb. rails, and only about 62 miles were ballasted with gravel and cinders. The maximum grades in both directions are 1.25 per cent and the sharpest curvature is 6 deg. Bridges were designed for an equivalent of Cooper's E-45 loading and since many rivers were crossed by untreated pile trestles there were serious interruptions to traffic by washouts. This line was not competitive with the Santa Fe system except at a few locations and it connected with the latter at eight points. It serves 85 towns which have no other railroad and which have prospects of developing considerable business. The relation of the Orient line to the Santa Fe system is shown in Fig. 2, also the extension of the Orient to the Mexican border at Presidio.

The Orient and Santa Fe System—The Santa Fe company recognized the possibilities of development in the territory served by the Orient line. It recognized also the large operating saving that could be made by a unified system, as well as reductions in distances from some competing points. Thus from Wichita, Kan., to Sweetwater, Tex., the distance is reduced 158 miles. To make the Orient line an effective part of the Santa Fe system it will be brought up to the standards of the latter. Bridges will be renewed with creosoted material and made capable of carrying the road's heaviest locomotives, while the main river crossings will be rebuilt in part with steel spans to insure against washouts. Heavier rails will be laid and creosoted ties used in renewals. In some respects this work will be similar to the rehabilitation of the old Muscle Shoals line by the St. Louis-San Francisco Railway, as described in *Engineering News-Record* of Aug. 1, 1929, p. 168.

Terminal facilities of the Orient at Wichita, Kan., and San Angelo, Tex., will be combined with those of the Santa Fe, as will be the other facilities at these places and at the other six contact points: Viola, Harper and Anthony, Kan., Cherokee and Clinton, Okla., and Sweetwater, Tex. For operation, that part of the Orient line from Wichita to Altus, Okla., 260 miles, has been included in the Panhandle division, while that part from Altus to Alpine, Tex., 477 miles, has been assigned to the Slaton division.

Texas Extensions—The Orient had two projected extensions which are now being constructed by the Santa Fe. The extension from San Angelo to Sonora, Tex., a distance of 65 miles, has the latter's standards of 26-ft. base in cuts and 18 ft. on embankments up to 20 ft. in height. Track has 90-lb. relay rails on creosoted ties, fully tie-plated. The maximum curvature is 4 deg. In each direction the maximum grade is 0.7 per cent, with 0.04 per cent compensation per degree of curvature. Steel bridges will cross the North Concho River at San

Angelo and the South Concho River near Christoval. Other openings are provided with standard open or ballasted-deck pile trestles. The entire line is fenced with 39-in. sheep-proof fence and there will be frame stations, stockyards, section houses and cottages for agents.

For the second extension, from Alpine to Presidio, Tex., 86 miles, the route, as first proposed, paralleled the Southern Pacific Railway for about 8½ miles, but a joint trackage agreement has been made with that road for its use from Alpine to Paisano, 11.21 miles. Connections at these points will be operated by remote-control apparatus, to avoid the necessity for interlocking plants. On this extension the maximum curvature is 4 deg. and the maximum grade in each direction is 1 per cent, compensated 0.04 per cent per degree of curvature. South from Paisano to Presidio the construction is extremely heavy. The line follows Alamito Creek and crosses it four times by steel girder spans on concrete piers, and once by a 1,200-ft. steel viaduct. The standard construction is the same as on the San Angelo line.

At Presidio, Tex., a 1,960-ft. open-deck pile trestle will give a connection with the Orient line in Mexico and thus provide for the interchange of traffic at lower cost and in less time than by other routes. From Chihuahua to Kansas City by way of El Paso, the distance is 1,331 miles, whereas by this new connection it will be 1,203 miles, a saving of 128 miles. Between Chihuahua and Galveston the distance by El Paso is 1,373 miles, whereas by this new connection it will be 947 miles, a saving of 426 miles.

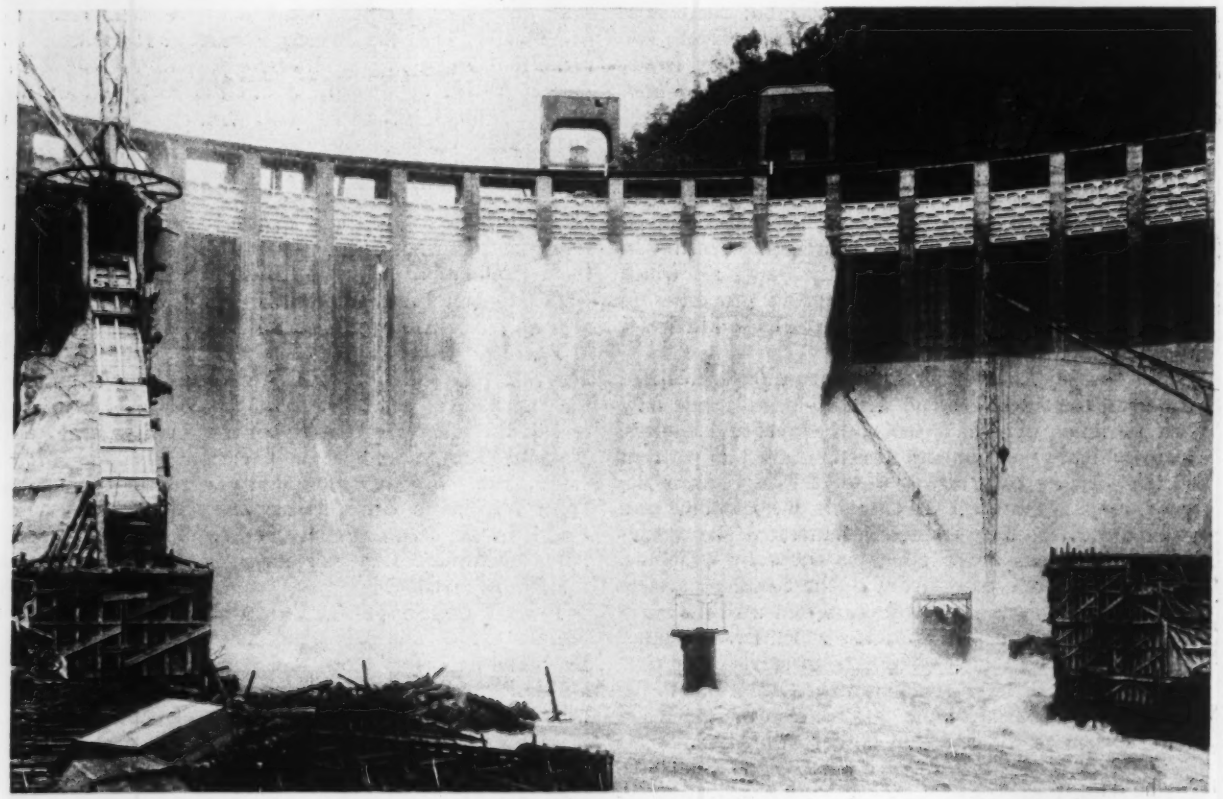
This reconstruction and extension of the original Orient line is being carried out under the direction of G. W. Harris, chief engineer of the Atchison, Topeka & Santa Fe Railway System, and R. B. Ball, assistant chief engineer of the system.

Flood Overflow on Calderwood Dam Scours Deep Into Rock

Effect of 185-Ft. Free Drop Graphically Shown When Dam Is Overtopped Before Cushion Pool, Under Construction, Is Completed

THE scouring effect of a 185-ft. free fall of water upon rock was graphically illustrated when a twenty-day flood overflow at Calderwood dam on the Little Tennessee River had subsided, revealing a hole roughly 30x50 ft. and 50 ft. deep, scoured out of the rocky riverbed 75 ft. downstream from the toe of the dam. The Calderwood dam (see *Engineering News-Record*, Dec. 19, 1929, p. 954) is a high arch structure of full overflow type, with a gravity dam situated a short distance downstream from the arch to create a cushion pool 40 ft. deep to receive the overflow. In addition to the water cushion the overflow jet is to be tempered by a heavy concrete bucket deflector built on the riverbed along the line where the main overflow will strike, and the base of the arch dam is further protected by concrete armor. This arrangement of cushion-pool dam and jet deflector was considered necessary to pass safely a maximum flood of 200,000 sec.-ft.

The arch dam, intake tunnel and power house were completed by April 15, and on that date the river-diversion gates in the dam were closed, permitting the reservoir to fill. Completion of the cushion-pool dam and the bucket deflector had purposely been delayed until the diversion gates were closed to permit the construction of these structures without the use of cofferdams, as a long record of flood flows on the river indicated that at this



VIEW OF OVERFLOW FROM BELOW

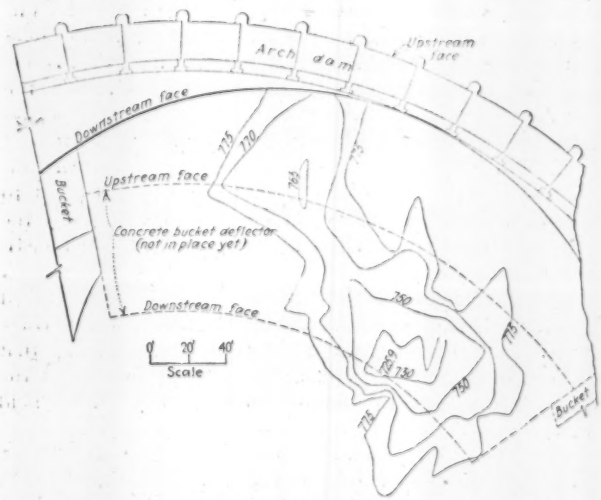
Part of cushion-pool dam can be seen at extreme lower left. Pier in lower center was used as measuring point for determining actual deflection of arch dam under load.

CLOSEUP VIEW OF HOLE, SHOWING CHARACTER OF ROCK

Foundations of arch dam go down through laminated and folded formation shown here, to depth within a few feet of bottom of hole.

time of the year any normal flood could be handled through the turbines. However, on May 11 a flood greater than could be taken care of through the penstocks and turbines commenced spilling over the top of the arch through four Stoney gates opened at the center of the dam. At this time about half the ultimate length of the cushion-pool dam was completed but had no effect in creating a pool. The spilling continued until May 31, reaching an estimated maximum flow of 10,000 sec.-ft. on May 19.

The falling sheet of water, striking the rock ledge about 75 ft. downstream from the toe of the arch dam, scoured out the hole, roughly 30x50 ft. and 50 ft. deep. The rock is laminated and folded, and more susceptible



CONTOURS SHOWING RELATIVE LOCATION, SIZE AND DEPTH OF THE HOLE BELOW THE DAM

to scour than solid formation. The foundations of the arch dam extend down to an elevation about 15 ft. above the bottom of the hole.

After the flood flow ceased the hole was filled with concrete, and completion of the cushion-pool dam and jet deflector is now under way.

The dam is being built by the Aluminum Company of America as part of its hydro-electric development of the Little Tennessee River, this project being located at Calderwood, Tenn.

Present Development of Sewage Treatment in Oregon

Serious Lack of Maintenance and Inadequate Operation Evident—More Effective State Control Advocated

MORE attention to the proper operation of existing sewage-disposal plants in Oregon and authority for more rigorous state supervision and direction, particularly for those works built by smaller communities where only a minimum amount of attention can be expected, are the important needs in the sewage-treatment field in that state as pointed out in a paper by R. E. Koon, consulting engineer of Portland, at the recent convention of the Professional Engineers of Oregon. After discussing phases of the general problem he described present conditions existing in the state as a whole, aside from the city of Portland. Salient facts brought out are outlined in the following.

At the present time there are in the state 84 cities with populations of more than 600. Statistics from 81 of these, having a combined population of about 260,000, indicated that 63 have sewer systems. Further, there are 23 different works in the state intended to aid in the proper treatment and ultimate disposal of sewage. These plants serve a population of about 72,000.

With the exception of six, these plants are all of the plain septic tank type and, in general, their operation is most unsatisfactory. Lack of care and attention has resulted in making these plants disappointing to both owners and designers. In their present condition they can be classed merely as places for the retention of sewage without accomplishing any beneficial treatment.

Four of the six remaining plants which have provision for secondary treatment also are suffering from lack of maintenance and insufficient operating attention. Thus, it was pointed out, all except two of the 23 plants in operation are unsatisfactory as to results produced. Gross neglect in operation and care, with only minor troubles apparent because of improper design explains this condition.

The two remaining plants, one at La Grande and the other at Klamath Falls, show what can be expected of disposal plants under proper operation and maintenance. The La Grande plant, in use for three years with 24-hour attendance each day, was the first sewage works in Oregon to be operated as designed. The appearance of the works, the surroundings and the manner of operation indicate that it will function properly and produce a satisfactory effluent. The more recent plant at Klamath Falls, in operation only a short time, is of modern design and with the continuation of proper attention and operation should prove equally efficient.

The general lack of care and the improper operation of the 21 other plants is laid to lack of teeth in the present public health laws of the state. Provision for the enforcement of operating and maintenance requirements must be included in public health measures. Realizing the inability of small cities to provide adequate operation and supervision, it becomes the state's duty, properly lying in the province of the board of health, to see that each sewage-works is adequately supervised and operated. Needed strengthening of state laws to that end will come only through education of the public to an understanding of the sanitary problem, a task in which the engineer must lead.

Why Boulder Dam Height Was Increased

Raising the Storage Level 25 Ft. Is Found to Give More Economical Structure and Better Utilization of Stream—Floodflows, Silting of the Reservoir and Water Demand Considered in Recent Studies

EVERY reservoir development has an ideal height of dam, one which will yield power or water at a minimum unit price. The designers of Boulder dam have sought to approach this ideal as nearly as local conditions permit, by increasing the height from 557 ft., formerly proposed, to 582 ft., as recently approved by the Colorado River Board. The data underlying this change are outlined in the following, mainly on the basis of a report by E. B. Debler, hydraulic engineer of the Denver office, U. S. Bureau of Reclamation. The Boulder Canyon act stipulates a minimum reservoir capacity of 20 million acre-feet; the 557-ft. dam (with 7-ft. freeboard) would provide 26 million; and the new plan, 25 ft. higher (with 3-ft. freeboard), provides 30.5 million.

Power costs would decrease up to a capacity of 34 million acre-feet, it is found from cost studies. But to go higher than the level now set would steadily encroach on the Bridge Canyon dam site, next upstream. A 582-ft. dam will provide more effective flood control than a 557-ft. dam and yet leave a more effective power supply. With a lower dam, either power or flood storage would have to yield more extensively to the other.

In their analysis of the hydrological factors, the Reclamation Bureau engineers considered upstream influences, such as floods, droughts and silt burden, and then the downstream elements such as flood control, power, water supply and bank erosion. Water records have been scanty until recent years. As a safeguard, Mr. Debler has allowed a factor of 10 per cent for possible overrating on estimates of average flow.

Gage records at Yuma have been kept since 1878, but authoritative runoff tabulations began in 1895. Not until the past decade have regular discharge records been kept at key points along the river. Supplementing the Yuma records, inflow in Great Salt Lake can be estimated from lake levels over the past 78 years; comparison with this adjacent basin is valuable in spotting the low periods. Additional facts have been gleaned from rainfall records, contemporary accounts and the testimony of old residents concerning old flood marks. Much importance attaches to the 1884 flood, the highest known, with a discharge of 250,000 to 300,000 sec.-ft., judged to be a near maximum for all time. From this 1884 example and lesser floods throughout the record, recurrence over long periods is estimated in cubic feet per second as follows: once in five years, 130,000; twenty years, 190,000; 500 years, 320,000; and 10,000 years, 450,000 sec.-ft.

Medium and Low Water—Mean annual discharge for the past 30 years is estimated between 16 and 18 million acre-feet. From these must be subtracted the probable upstream demand. Under 1928 conditions the mean annual inflow into Boulder Canyon is given as 15.7 million acre-feet; in 1988, the end of the 50-year repayment period, the inflow would be reduced to 11.9 million. Irrigation and evaporation-loss estimates are based on a normal consumptive use of 1.5 acre-feet per acre on irrigated areas and 4 ft. per year on the surface of reservoirs. Upstream reservoir capacity is estimated as 11 million acre-feet by 1988. To take account of the severest conditions of low water, the period immediately following 1900 is taken as a basis for estimating firm power.

Reservoir Operation—Reservoir operation will be based not only on these general data but on estimates of flow prior to each operating season. In 1884 indications of heavy runoff were at hand before the end of the winter. This and other observations support the conclusion that operation may be based on runoff predictions.

The following outflow will clear the excess from high floods: April, 55,000 sec.-ft.; May, 65,000; June, 75,000; July, 75,000; and August, 50,000. River losses, including the All-American Canal, would reduce these flows by 13,000 sec.-ft. at Yuma. Such outflows require a flood-reserve capacity of 9,500,000 acre-ft. as of 1938 and 4,000,000 as of 1988.

To supply downstream water demands under present conditions requires a maximum discharge of 10,055 sec.-ft. The maximum demand in 1938 would be: present loss and use, Boulder Canyon to Yuma, 2,800; Los Angeles aqueduct, 1,500; All-American Canal, 2,000; Mexico, 2,000; total, 14,300. The Mexican demand is not likely to increase. Further regulation may be provided by a dam at Parker for the Parker and Parker-Gila projects, or by a reservoir at Bulls Head; power would make this latter self-sustaining, it is stated.

Siltage Effects—The Colorado River Board advanced the estimate of silt deposits in the reservoir from 80,000 to 137,000 acre-ft. per year, due to changes in estimates of the volume under water occupied by a given weight of suspended matter. Another factor is the large and unknown bed burden of particles that roll or jump along without actual suspension. Contemplated upstream reservoirs of 11,000,000 acre-ft. capacity would reduce the silt load materially. Silt accumulation during the repayment period has been estimated at 3,000,000 acre-ft.

The effect of the discharge of clear water is still considered an open question. If the stream is caused to meander, a flood danger would result. Accordingly the reservoir discharge should be limited to 75,000 sec.-ft. for 1884 conditions.

Bridge Canyon Dam Not Harmed—The increased height of dam will not materially affect the Bridge Canyon project, according to Mr. Debler, who states that there will be no encroachment at all three-fourths of the time, and that the maximum will be 23 ft. This is held to be of negligible effect on a high dam installation.

Power Considerations—Raising Boulder Canyon dam from 557 to 575 ft. height would mean a cost of 0.55 mills per kilowatt-hour for the increased output; an increase from 575 to 582 would mean a cost of 0.76 mills per kilowatt-hour on the added energy. Although the cost of additional power mounts rapidly with the height, obviously it is far below the selling price of 1.63 mills per kilowatt-hour of firm power. The increased construction cost underlying these figures is given as $4,392,000, or $206,322 per year. Continuous output and annual output for the different heights studied are as follows: 557 ft., 547,000 hp. continuous and 3.6 billion kilowatt-hours annual; 575 ft., 585,000 and 3.8 billion; 582 ft., 597,000 and 3.9 billion.

Utilities Must Prosper but Not Profiteer

President of National Electric Light Association, Writing of Utility Regulation, Emphasizes Community of Interest Between Utilities and the Public—Regulation Necessary—Must Be Based on Keeping Utilities Sufficiently Prosperous to Attract New Capital

MATTHEW S. SLOAN, president of the National Electric Light Association, writing on utility regulation for the N.E.L.A. convention issue of Electrical World, expressed certain views upon utility regulation which are especially pertinent at this time. An extract of what Mr. Sloan said follows.—EDITOR.

When government, made up of fallible human beings, undertakes to regulate so complex a business as that of public utilities, also made up of fallible human beings, it is idle to expect perfection in the results obtained. With the utmost good will, with the utmost public spirit, the highest intelligence on both sides, the results are bound to disappoint somebody or a good many people. It is not surprising, therefore, that there has been an outcry that regulation of public utilities has failed.

What people want, if I am capable of judging, is the knowledge that no private company or interest is bigger than the public, free of control. That is, regulation is wanted.

The present situation, with utilities grown into great organizations, with large holding company groups interrelated and apparently dominating the field of power supply, with federal and state investigations of utilities and utility laws, contains elements of danger—danger both for the companies and for the public. It is no time for theories or threats by anybody. *It is time to remember two important and inescapable facts.* The first is that there is a basic community of interest between the utilities and people, and what is unjust or harmful to either is, in the long run, unjust or harmful to the other. The second is that utility regulation has grown up over many years, law by law, order by order, court decision by court decision, and cannot be thrown down overnight, even with the best of motives.

I believe utilities, as a business impressed with a public interest, owe an obligation to the people somewhat heavier than ordinary business, but that nevertheless they are private business, their capital devoted to a public purpose. I believe, therefore, that they need to consider, endeavor to define and live up to standards of social justice, if such can be ascertained. I can draw up standards of operation for the utilities and the people which seem just to me. They may not seem just to others.

I believe utilities should supply the highest standards of service possible under the conditions in which they operate, and those conditions—the nature of their territory, their human, physical and financial resources—would have to be considered. They should keep their plants and equipment scientifically up to date. They should endeavor to meet the needs and desires of the people and the communities served. They should use commercial enterprise in extending the number of uses and sales of service. They should co-operate with public spirit in good-citizens' movements and community development undertakings. They should pay their employees well and provide properly for advancement, and for insurance, retirement and the like. They should charge prices which will keep them prosperous and attract new capital, but should not profiteer.

I believe the state should regulate utilities to make certain that their services will be modern, progressive, making due allowances for individual conditions. It should make certain that they receive, if they can earn it, sufficient income to keep them prosperous. Otherwise they cannot be good and desirable workmen. It should not allow them to profiteer, if they try to. It should check the honesty and accuracy of their accounts and financial transactions. It should have access to all information necessary to form an estimation of the propriety of their prices.

It is in the application of these principles that difficulties occur, and they occur because human beings are human beings.

In practical fact there is only one point of serious difficulty between the utilities and the public in utility regulation today. It is in the matter of rates. Matters of service seldom come to an issue. The utilities, as good business practice and as a matter of pride, exert their utmost efforts to make their service safe, certain and satisfactory.

Nobody on earth can set a satisfactory price on anything. Acceptable prices, fair prices, reasonable prices may be made. They must be changed from time to time, as business costs and market conditions vary. Social justice and the laws, as I understand them, require utilities to supply their service at fair prices.

There are two tests which may be applied. One is a business test: Can the utility company, at the existing scale of rates and with its existing costs, obtain revenue sufficient to pay its obligations, maintain its service in prime condition and readily get new capital for service extensions? If it can, the rates are not too low. Can it readily increase the number of new customers and the volume of sales to existing customers? If it can, the rates are not too high. Can the utility, by lowering its rates, stimulate its growth and the use of its service without endangering its financial position? If so, it should.

The other is a legal question: Will a given scale of rates, with existing costs, yield a rate of return which the courts will declare not confiscatory of the company's property and still not excessive? If they will, the rates are legal. They may or may not be fair or reasonable from the business point of view and in the abstract light of social justice.

It is the application of the legal test which makes all the trouble. Now that test is part of the system of utility regulation, a part of the law of the land, and I believe that it is necessary and inescapable that it be there to be appealed to in case of emergency. Appeal to it, however, whether by public officials or utilities, is proof positive that there does not exist an appropriate harmonious relationship between utilities and state. The long-drawn-out litigation which must follow, with its dis-

puted valuation claims, is as far from harmonious relationship as anything could be. Such litigation is the basis for a vast amount of assertion that regulation has broken down.

I believe too much emphasis is put on the legalistic aspect of rates, valuation and all elements which enter into rate cases—too much for good business and too much for social justice.

The reasonable rate, the rate which is reasonable for company and the rate which is reasonable for consumer, is a rate which will leave the company sufficient money in the treasury to have it recognized as a sound and prosperous concern, and at the same time promote a free use of current by consumers.

The intelligent operator, if his treasury is getting too fat, is going to reduce his rates, both on the grounds of social justice and on the grounds of good business sense, because thereby his company's prestige will be enhanced and his business increased. He will do this even when the company earns below what ordinarily is considered the legal rate of return on valuation provable to the court's satisfaction. Many electric utility operators have done so. I think that in all probability a majority of the electric companies are now earning less than a legal rate of return, but they are not insisting on having it, because to do so would cost more than it would be worth in customer good will and sales increase stifled.

I doubt whether in our lifetime or our children's the system of regulation and laws on which it is based will be reduced to a mathematical process.

I am sure it will be improved in its application to changing conditions as it should be, but I don't look for a regeneration of human nature this year, or even next year. Therefore I fear there will be a "utility issue" with us for some time to come.

Letters to the Editor

Consultant's Costs

Sir—In your issue of May 15, 1930, you make editorial comment on the subject of costs of operating an office for consulting engineering practice, and you conclude with an observation to the effect that more data on this subject should be available. It is hardly necessary to say that the engineering profession as such, and in a broader sense the general public, will be benefited by the establishment of sound economic methods for determining these costs.

In discussing consulting engineering practice, I wish to make it clear that I am discussing practice in which only professional services are rendered or "sold" to a client, and in which no manufacturing of equipment or apparatus and the sale of the same are involved, nor the purchase and resale of apparatus and equipment.

Let us assume that the firm of Jones & Robinson consists of two partners who are actively engaged in the conduct of affairs of their firm and whose time and efforts are practically entirely devoted to this purpose. Each of the members of the firm should be paid a fixed salary for the services which he renders to the firm as such. The salary to be paid should be equal to the amount it would be usual to pay an employee who performed services of the same character, or which a corporation, for example, would pay to an officer who performed such services. Let us further assume that the firm employs a staff of draftsmen, inspectors or outside superintendents, stenographers, clerks and office boys.

Into the cost of rendering services in connection with any particular project or job there enter items which may be termed direct costs. These would include the cost of the time spent exclusively on a particular project by the members of the firm or by any members of the staff. To determine these costs it is necessary for time sheets to be filed at stated periods by the members of the firm or the officers of the corporation, as well as by other members of the staff of employees. To those professional engineers who might cavil at keeping record of their own time let me say that it is a very simple matter, particularly after it has become a habit.

In addition to the direct costs just noted, there are a large number of items which enter into the costs of rendering services and which are generically termed indirect costs or overhead. These indirect costs include a proper proportion of the following items:

1. Office rent.
2. Office supplies, such as stationery, towel service, electricity, etc.
3. Drafting room supplies, but not including blueprints furnished to clients. (The matter of blueprints will be dealt with separately below.)
4. Postage.
5. Telephone and telegraph service.
6. Subscriptions to technical publications and books for the office library.
7. Outlays for carfares, railroad fares, etc. (If sizable outlays are made which can be charged directly to a particular job, such items should be entered as a direct cost.)
8. There is a certain amount of time spent by the members of the firm as well as by members of the staff which is necessary to the conduct of an engineering office but which is not directly chargeable to any particular project. Such time would be that spent by the members of the firm in negotiating for new projects, in directing the finances of the office and other office routine, the time spent in writing general correspondence, filing, etc. This item may constitute as much as 50 per cent of the time of a member of the firm and as little as 5 per cent of the time of a draftsman and even a larger percentage of the time of a stenographer. It is easily ascertainable from the time sheets, if each person records every day on his time sheet, the number of hours spent on each project, with the remainder of the time of that day charged to an account which, for convenience, may be termed "General."

The method of distributing these indirect charges proportionately among the various jobs is as follows: At the end of each year a total is made of all items which can be included under direct costs—namely, the proper cost of time so chargeable and of outlays so chargeable. Likewise a total is made of the indirect costs throughout the year, including all the items listed above. The relation of the total indirect charges to the total direct charges can be termed the percentage of office overhead, and this percentage can then be applied to the direct cost of any individual job to establish the item of indirect cost for that particular job.

This percentage for overhead will usually be found in a well-established office to be fairly constant during a period of years. It will vary, of course, in different localities. In our experience it averages about 80 per cent.

It is not my intention to discuss the question of charges to clients for engineering services further than to say that charges should be such as to allow a reasonable profit in addition to the total cost of rendering the services. In other words, the fee charged, whether on a percentage or a fixed sum basis or otherwise should allow for a reasonable profit above the total cost (direct plus indirect) of the service.

I should like to add a word in reference to the matter of furnishing blueprints. Under modern conditions, in the larger cities at any rate, it is no longer customary for an engineer to make his own blueprints. This function is usually performed by people who specialize in this work, who call for the tracings, print, bind and deliver the prints. It is the custom among many engineers to furnish blueprints to their clients at actual cost without adding anything to cover overhead and profit, inasmuch as no use of office space and no handling are involved in the furnishing of these prints.

New York City, June 9, 1930. MORTIMER FREUND, Consulting Engineer.

News of the Week

Seven-Story Brick Building Collapses in New York City

Seven Men Escape as 35-Year-Old Structure Falls—Cause of Accident Uncertain

WITHOUT any preliminary signs of distress a brick warehouse at 415 Washington St., New York City, on June 20 collapsed completely, filling the site and the entire street in front with a mixture of brick, broken timbers and stored materials, mostly foodstuffs. Although it is not believed that any persons were caught in the ruins, this will not be definitely confirmed until the wreckage is completely cleared away. Seven men who were at work on the loading platform at the street level escaped unharmed, and two men on the roof of the structure suffered slight bruises but no serious injuries.

The building, which was about 35 years old, had brick walls with a timber floor system consisting of 4x12-in. beams framed into 12x14-in. girders. These were supported by the exterior walls and by interior columns with spread concrete footings on clay. It is believed that the first failure occurred at the front wall near the top of the building, but whether this was due to the settlement of interior columns or to some other cause cannot be determined until the site has been cleared, if at all. The loading, although fairly heavy, does not appear to have been excessive for this type of construction.

Wide World Photo

RUINS OF COLLAPSED WAREHOUSE IN NEW YORK CITY

Injunction Sought to Halt Boulder Dam Project

Court action to block the Boulder dam project was taken on June 24, when an injunction suit was filed in the Supreme Court of the District of Columbia by Fred T. Colter as trustee of the Arizona Highline Reclamation Association. Mr. Colter is said to be a candidate for governor of the state. A court order is requested to restrain the secretary of the interior from taking any action under the contracts with the city of Los Angeles and the Metropolitan Water District of California.

The petition claims that exploitation of water resources of the Colorado by the government is a confiscation of Arizona's property without due process of law. It is stated that Arizona has made plans to develop the power resources of the Colorado, and that the Federal Power Commission has approved them.

Members of the Arizona delegation in Congress profess surprise over the filing of the suit.

Maryland Bridge Collapses Under Heavy Load

One span of a steel highway bridge near Frederick, Md., collapsed on June 19 while a loaded truck was passing over it. The bridge, consisting of two 100-ft. through trusses on masonry piers, was undergoing repair at the time of the accident and a repair truck and compressor were on the deck of the bridge, as were a number of workmen. Three of the workmen were killed and others were more or less seriously injured.

The moving truck, loaded with stone for a local lime company, had passed the standing truck of the repair company and had nearly reached the far end of the first span when collapse occurred.

The cause of failure has not yet been determined. The Maryland State Roads Commission has engaged J. E. Greiner & Co. to assist in an investigation of the accident.

President Signs Bill Creating New Power Commission

Reorganization of the Federal Power Commission, henceforth to consist of five full-time members appointed by the President, was definitely assured June 24 by President Hoover's approval of the act authorizing this step, which also provides funds to increase the organization of the commission. No appointments have yet been made, but the President has indicated that the five commissioners will be selected before the adjournment of the Senate, which will thus be enabled to ratify the appointments promptly.

Chicago to Vote on Unified Traction Service on July 1

Under Proposed Franchise a Local Transit Commission Would Regulate Service

A REFERENDUM vote of the people in Chicago is to be taken July 1 on a franchise, terminable on purchase by the city, to be granted a gigantic transportation corporation, which will acquire all of the existing traction companies, both surface and elevated, at an agreed upon appraised value of $260,442,000.

Under an enabling act of the state legislature last year, a transit commission is set up to handle locally the duties of the Illinois Commerce Commission in regulation of rates and services and designation of construction features. The three members of the commission are to be appointed by the mayor by and with the advice and consent of the city council.

Within ten years $200,000,000 is to be spent by the corporation, not less than $65,000,000 of this amount within three years. The $61,000,000 which has accrued to the city from the 55 per cent of net earnings of the surface lines under the 1907 franchise is to be transferred to the local transit commission and expended for subways to be equipped, maintained and used by the company rent free. The subways are to be built during the ten-year period and additional money will be obtained by special assessment levied on property benefited. Under the ordinance return to the city is to be 3 per cent of gross but payable after payment of operating expenses, bond interest and sinking funds, preferred dividends and sinking funds for preferred stocks. It comes ahead only of any dividend on the $77,000,000 common stock.

Same Rates of Fare

Rates of fare are to remain as now, until changed by the transit commission, 7c. for surface rides and 10c. for elevated and subways, hereafter called rapid transit. Transfers, however, are to be universal, with a 3c. charge from surface to elevated but no charge from rapid transit to surface lines.

Paving of the right-of-way is still to be done by the company, as is cleaning of snow and so far as practicable cleaning a traffic lane on each side of the tracks, but other street cleaning is to be done by the city.

Extensions and improvements are listed in some detail, being spread out over the city first by the engineers and finally added to by aldermen in much the

same fashion as a bond issue road system is located to insure eliciting the voting interest of all sections. At least 30 miles of surface line extension is to be provided each year. Half of this mileage is to be street railway and half motor vehicle or trackless trolley.

The most notable elevated extension is a north and south mid-city trunk line in Ashland Ave., permitting north and south travel without entering the Loop.

A four-track subway is planned in State St. from a junction with the present elevated at Chicago Ave. on the north side to a junction south near Sixteenth St. This will relieve the present elevated loop, which can be utilized for rapid transit primarily serving the west side. An additional two-track subway serving the west, southwest and northwest side rapid transit lines is also planned. It will be located in Dearborn St., with branches to the west at Grand Ave. north and Harrison St. south.

No fewer than 1,000 rapid transit cars are to be purchased and no fewer than 1,000 street cars or motor vehicles. The existing plant of the rapid transit will be greatly improved, curves straightened, new stations and platforms built and escalators installed to facilitate transfer.

St. Lawrence Bridge Board Named

Governor Roosevelt, of New York, has appointed a commission of five to study the feasibility of building one or more bridges across the St. Lawrence River to Canada, report on the best available site and submit a concrete plan for the project. The act under which the commission was appointed stipulates that it shall make borings, surveys and other field investigations necessary to a complete study of the feasibility of the plan. The act also authorizes the employment of such needed assistance, including engineers, as may be necessary.

The governor's appointees are: Francis K. Kernan, of Utica, president of the Bossert Corporation; Henry H. McConville, of Ogdensburg, general commercial superintendent of the Northern New York Telephone Co.; R. J. Buck, of Watertown, president of the Northern New York Trust Co.; William Allen Newell, of Ogdensburg, president of the Newell Mfg. Co.; Walter F. Wilson, of Massena, president of the First National Bank & Trust Co. of Massena and a former deputy state highway commissioner.

Validity of Kentucky Bridge Bonds Upheld

Validity of the contracts by the Kentucky state highway commission for the sale of approximately $15,000,000 bridge bonds and the constitutionality of the legislative act were upheld on June 14 by the circuit court. The bonds provide for seven bridges over the Ohio River and for seventeen over streams within the state.

Cleveland Makes Plans for Summer Meeting of Civil Engineers Society

TRANSPORTATION is the dominant note on the program of the 60th annual meeting of the American Society of Civil Engineers, to be held in Cleveland, Ohio, July 9-12. The new Cleveland terminal is well along toward completion, so much so that most of the railroads are entering it, at least with commuter trains. Attendants at the convention will see the buildings and many miles of tracks from open-top observation cars drawn by electric engines. At Akron, one hour away toward the south, the Goodyear-Zeppelin Corporation is making history in air transportation by building two 6,000,000-cu.ft. airships for the U. S. Navy. These manufacturing operations and the huge dock and factory building in which the work is carried on will be the scene of another inspection trip, by means of special trains. Committees of the Cleveland section are making special efforts to produce a meeting phenomenal in subject matter and entertainment.

Technical Sessions

The technical sessions begin in the afternoon of July 9 with two papers: "The Shaker Heights Development and Rapid Transit as a Part of the Terminal Plan," by William E. Pease, chief engineer, Cleveland Interurban Railroad Co.; and "A Description of the Cleveland Union Terminal Development," by H. D. Jouett, chief engineer, Cleveland Union Terminals Co. On Thursday the excursion to the airship factory and dock at Akron will be held, and in the afternoon a paper on its design and construction will be given by Wilbur J. Watson, consulting engineer, Cleveland, Ohio, and discussed by Karl Arnstein, vice-president, Goodyear-Zeppelin Corporation, and Rear Admiral A. L. Parsons, chief, bureau of yards and docks, U. S. Navy, Washington, D. C. "The Design and Construction Features of the Cleveland Union Terminal" will also be described at this meeting by C. P. Marsh, engineer of structures, Cleveland Union Terminals Co.

In the same afternoon several division meetings will be held. The waterways division meeting will hear a paper entitled "Coal Dock and Car Dumper Plant of the New York Central Railroad at Toledo, Ohio," by D. R. Leffler, engineer of bridges, New York Central Railroad Lines West of Buffalo. The city planning division will hear about Cleveland's metropolitan park system from William A. Stinchcomb, director, Cleveland Metropolitan Park Board. At the sanitary engineering division meeting "Sewage Works Operation and Control" and "Filtering Materials for Trickling Filters" will constitute the principal subjects of discussion. On Friday will be held the all-day excursion to the Cleveland Union Terminal.

American Standards Association Completes Financing Program

With the announcement that the American Railway Association will contribute $15,000 a year for three years, the American Standards Association announces that the desired total of $150,000 a year has been made available to promote the work of the association in the establishment of national industrial standards. The other organizations which have joined in the underwriting are: Aluminum Company of America, American Telephone & Telegraph Co., Bethlehem Steel Co., Consolidated Gas Co., Detroit Edison Co., Ford Motor Co., General Electric Co., General Motors Corp., Gulf Oil Co., Public Service Corporation of New Jersey, Standard Oil Company of New Jersey, United States Steel Corp., Westinghouse Electric & Mfg. Co., and the Youngstown Sheet & Tube Co.

$3,000,000 New York Subway Contract Defaulted

The New York City board of transportation has declared defaulted the $3,000,000 contract of D. C. Serber, Inc., for the construction of the Fourteenth St.-B.-M.T. subway connection from Sixth Ave. to Eighth Ave. The work on the subway, which will link the Fourteenth St.-B.-M.T. line with the new Eighth Ave. line, is about 90 per cent completed. Mr. Serber testified before the board that he is without funds with which to continue the work, that he is unable to pay workmen or to buy materials, and that therefore he is forced to abandon the job.

The board instructed its chief engineer to take over the uncompleted subway and to maintain the structure in a safe condition until bids for a new contract to finish the work can be received and the contract awarded.

Cleveland Contractors Charged With Violating Anti-Trust Laws

Sixteen Cleveland electrical contractors and three electrical union officials were indicted by a grand jury in Cleveland June 20, charged with conspiring to fix prices for electrical construction work, with stifling competition and forcing many contractors out of business, a violation of the Valentine anti-trust laws. The indictment charged the defendants conspired and organized for the following purposes: (1) to create and carry out restrictions in trade and commerce in electrical wiring and fixture installation; (2) to prevent competition in the manufacturing, making, purchase and sale of a certain commodity—electrical wiring and fixture installation; (3) to increase the price of a certain commodity—electrical wiring and fixture installation. All the defendants were released on bonds of $1,000 each. Trial will probably be held in September.

Judge Refuses Injunction to Halt Osage River Dam

Federal Judge Albert L. Reeves, at Kansas City, Mo., on June 18 declined to issue an injunction against the Union Electric Light & Power Co., of St. Louis, Mo., to prevent it from continuing with the construction of the $30,000,000 hydro-electric dam and power plant on the Osage River near Bagnell, Mo. The proceedings were brought by Morgan Moulder, prosecuting attorney of Camden County, and attacked the constitutionality of the federal water-power act on the theory that the state owns all the waters within its boundaries and that one of the provisions made at the time Missouri was admitted to the Union was that its waters would always be left open.

St. Paul Again Defeats City Manager Charter

The city manager charter which was defeated by the voters of St. Paul, Minn., on Nov. 5, 1929 (see *Engineering News-Record*, Nov. 21, 1929, p. 828), with some amendments was again put to vote on June 16 and was again defeated. At the November election the charter fell about 5,000 votes short of the requisite 60 per cent. At the recent election the actual majority against the charter was in the neighborhood of 7,500 votes, this in spite of the fact that the election was scheduled for the same date as the state primary, which was considered a very favorable time for such an election to be held.

Long Island Trains Operating Over New Track at Jamaica

Inauguration of train service over part of the elevated trackage of the Long Island Railroad's Jamaica East improvement marks the completion of the first stage of this $6,000,000 grade-crossing elimination, which was ordered by the Public Service Commission in 1923. The south retaining wall and a timber crib now confine a fill on the south part of the right-of-way which supports three tracks on the high level. On Sunday, June 22, these tracks were put into service, replacing three tracks at grade which had carried traffic totaling 275 trains per day. The lower tracks will now be torn up and the north retaining wall and remaining fill constructed, providing a total of eight tracks. The project has a length of 8,500 ft. in addition to 3,800 ft. of steel viaduct and fill carrying the two tracks of the Montauk division over and away from the main line. It eliminates six grade crossings and three antiquated overpasses, as well as opening one additional street which had been dead-ended. Work was started Oct. 14, 1929, and completion is expected by February, 1931. Foley Bros., Inc., of St. Paul and New York is the contractor. G. R. Klein, assistant engineer, is in charge for the railroad.

WASHINGTON NOTES

By Paul Wooton
Washington Correspondent

Colonel Pillsbury Confirmed as Assistant Chief of Engineers—Harbors Bill Goes to President

THE Senate on June 20 confirmed the nomination of Col. Charles B. Pillsbury to be assistant to the Chief of Engineers of the army. He will take over the duties of the office before the end of the month. As was the case in the selection of Major-Gen. Lytle Brown to be Chief of Engineers, the regular order was departed from in the selection of Colonel Pillsbury. In making this choice the officers passed over were: Gen. Herbert Deakyne, who just has completed a four-year term as assistant Chief of Engineers; Gen. Thomas H. Jackson, president, Mississippi River Commission; Col. William B. Ladue, engineer commissioner, District of Columbia; Col. William J. Barden, division engineer, North Atlantic division; Col. Edward H. Schulz, commandant, Army Engineer School; Col. Harry Burgess, governor, the Panama Canal; Col. George M. Hoffman, in charge of the First New York district; Col. Sherwood A. Cheney, in charge of the Boston district; Col. Harley B. Ferguson, division engineer, South Atlantic division; Col. Earl I. Brown, engineer, Eighth Corps Area; Col. James A. Woodruff, director, General Staff School, Leavenworth; Col. Edward M. Markham, division engineer, Great Lakes division.

Reasons Many Officers Were Passed Over

As General Deakyne had served a full term as assistant Chief of Engineers, the fact that he was passed over is in line with the policy of the general staff to confine such positions to a single term. General Jackson already holds a position regarded as more important than that of assistant chief. Colonels Ladue, Barden, Schulz, Burgess, Hoffman, Cheney and Ferguson are older in point of service than is General Brown. It is assumed that it would have been embarrassing to them to be made assistant to an officer junior in service. Colonel Woodruff has been specializing on the military side and is understood to be slated for a brigadier-generalship in the line of the army. Colonel Markham is the head of one of the three large subdivisions of the corps and is regarded as holding a more important place than that of assistant chief. As a result of this development Colonel Markham and General Pillsbury are left as the outstanding prospects for the office of Chief of Engineers when General Brown reaches the retirement age.

In recommending Colonel Pillsbury it is apparent that General Brown is not afraid of being outshone. Colonel Pillsbury was graduated first in his class in 1900 and has done outstanding service ever since. He is regarded as the best mathematician in the army and has made a name for himself in engineering and scientific work. During the war Colonel Pillsbury distinguished himself during the operations which broke the Hindenburg line between Cambrai and St. Quentin. In addition to his work as commander of the 102d Engineers and as the engineer of the Second Corps, he received special recognition from the British for work with their armies. Colonel Pillsbury's more important work in this country was in connection with the construction of the Alaskan road system and on the Great Lakes and St. Lawrence waterways. At his present station he has done important work in improving channel conditions in the Delaware River.

Rivers and Harbors Bill Passes Both Houses

Final approval of the rivers and harbors bill was secured on May 24 when both the House and Senate voted to accept a conference report on the bill. Although the Senate amended certain sections of the bill, the original plan was to have the House concur in the Senate amendments in order to save time. This procedure was objected to in the House, however, because of the precedent that it would set. No considerable objection was raised against the provisions of the Senate bill. The House and Senate conferees met on June 24 and summarily agreed to accept the changes made by the Senate. In its final form, therefore, the bill embodies all of the changes made by the Senate. The measure now goes to the President for his signature. It is generally supposed that he will sign it.

The principal changes made by the Senate are in respect to inland waterway development. The project on the upper Mississippi was allotted an additional $4,500,000, an additional $10,000,000 was made available for work on the upper Missouri between Kansas City and Sioux City, and an additional $1,500,000 was appropriated for the work on the Tennessee. The Senate also voted to increase the federal contribution toward the flood-control work in the Lake Okeechobee district of Florida.

Compromise on Chicago Water Diversion

After it had seemed that the entire bill would be held up by deadlock over the diversion at Chicago, the situation was cleared as the result of an amendment submitted by Senator Ransdell, of Louisiana. Senators from states bordering on the Great Lakes objected to the language of the bill dealing with the Illinois waterway. They contended that the diversion should be limited to 1,500 sec.-ft., which is the minimum diversion fixed by the Supreme Court for sanitation. This minimum diversion for sanitation, however, does not go into effect until 1938.

The threatened stalemate was prevented by the adoption of Senator Ransdell's amendment, which postpones final

limitation of the diversion until after the waterway is completed. Instead of limiting the diversion to 1,500 sec.-ft., the amendment permits sufficient diversion for a commercially useful waterway with a provision that substantial injury must not result to existing navigation on the Great Lakes. The Secretary of War is directed to make a survey of the waterway after it is completed and report to Congress his recommendations for a minimum diversion. As the final minimum diversion of 1,500 sec.-ft. fixed by the Supreme Court does not go into effect until 1938, the diversion up to that time will be 5,000 sec.-ft.

Senate Committee Kills Cramton Bill

Although the House inserted an amendment in the second deficiency bill for starting work under the terms of the Cramton bill, which calls for the development of a park in the gorge of the Potomac, this amendment was stricken from the bill by the Senate appropriations committee. As it passed the House, the bill provided $1,000,000 to be used to carry out the park development. Protests were made before the Senate committee that the money could be better used for necessary work in the city of Washington.

Filibuster Likely Over Boulder Dam

Despite opposition from Arizona, the section of the second deficiency bill appropriating $10,660,000 to begin work on Boulder dam has been left in the measure as it goes to the Senate. While it has been announced that the Arizona senators will conduct a filibuster against the appropriation when the bill reaches the floor of the Senate, it is not expected that these tactics will be successful. The bill carries many necessary appropriations and it is not probable that two senators alone will be able to defeat it.

Engineers to Be Consulted on Hydraulic Laboratory

An advisory committee will co-operate with officials of the Bureau of Standards in the design of the new national hydraulic laboratory. American Engineering Council has designated members of the advisory committee as follows: John R. Freeman; S. M. Woodward, University of Iowa; Ely C. Hutchinson, editor, *Power*; W. B. Gregory, Tulane University; L. F. Moody, Philadelphia; and B. R. VanLeer, assistant secretary, American Engineering Council. In addition, representatives of interested bureaus will be members of the committee. They are: Capt. J. P. Dean, Corps of Engineers; N. C. Grover, U. S. Geological Survey; F. H. McGrory, Bureau of Public Roads; E. C. Lane, Bureau of Reclamation; R. S. Patton, U. S. Coast and Geodetic Survey; L. J. Briggs, Bureau of Standards.

Fear was expressed that the design would be left too much to architects and not enough to men who have had experience with large hydraulic works.

The Business Outlook

The slight spring stimulus to business has spent itself, and activity has been declining since the middle of May. Our weekly index of production and trade stands at 88.7 per cent of normal. American business is giving a pretty poor exhibition of its proverbial spunk and shrewdness. After six months of scraping along the bottom, 120 million people have swallowed all the water and bruised all the hide they care to, and are bound to come up for air before long. The record low Reserve Bank rate may be the signal.

—The Business Week, June 25.

Personal Notes

EDGAR H. JONES, for the past thirteen years engineer for the North Sterling Irrigation District at Sterling, Colo., has moved to Denver, and since April has been connected with the engineering department of the Denver municipal water-works, located at West Portal.

HARRY ELLSWORTH CLIFFORD, since 1909 Gordon McKay professor of electrical engineering, has been chosen dean of the Harvard engineering school to succeed the late Hector James Hughes, who died on March 1, 1930.

FRANK PURSE, of Tacoma, Wash., an engineer and former member of the civil service commission of that city, has been appointed supervisor of public utilities of the State of Washington, a post that has been vacant since last August, when C. Rea Moore resigned.

ANSELMO F. DAPPERT, for eight years connected with the Illinois department of public health, first as assistant sanitary engineer and for the past five years as principal assistant engineer, has been provisionally appointed assistant sanitarian of the New York state division of sanitation.

RALPH W. POWELL, assistant professor of mechanics at Ohio State University, Columbus, Ohio, is spending his summer vacation in the U. S. Engineer office at Rock Island, Ill., working on the possibility of using storage reservoirs to give a 9-ft. navigation channel on the upper Mississippi.

N. ALTIERY, consulting engineer, of Philadelphia, Pa., has been elected vice-president and chief engineer of the DePaul Construction Co., Inc., of Philadelphia. Mr. Altiery has been connected with various public works, state highways, railroads, bridges and building projects throughout the Eastern, Southern and Central states.

ERNEST T. FRITON, who has been office manager for the architectural firm of La Beaume & Klein, St. Louis, Mo., has been elected commissioner of buildings for the St. Louis board of education for a term of four years beginning Sept. 1 next. As commissioner he will have charge of the design and construction of school buildings and other work undertaken by the board of education.

RAYMOND WILSON, who has been associate chemist in the research laboratory of the Portland Cement Association, has been appointed conservation engineer of that association. Mr. Wilson has been in the employ of the association since 1921, and is the author of "Tests of Colors for Portland Cement Mortars," "Coloration of Concrete," and "Limitations of the Absorption Test for Concrete Products."

Obituary

W. E. WAMPNER, who had been in the contracting business in Huntington, Ind., for 30 years, died recently at Battle Creek, Mich. Mr. Wampner was 63 years old.

HARRY C. MCLAUGHLIN, a contractor, of Indianapolis, Ind., died recently. Mr. McLaughlin was employed for 4½ years in the construction of the Panama Canal and for that service received a medal from President Roosevelt.

WILLIAM M. LEE, district engineer of the Iowa highway department, died recently in Cedar Rapids, Iowa. Mr. Lee, who was a graduate of Iowa State University, had been district engineer for the department at Cedar Rapids for twelve years. He was 42 years old.

WILLIAM BOARDMAN REED, for many years prominent in electric railway development in New York City, died on June 19. In 1894 Mr. Reed became an engineer in the maintenance-of-way department of the Metropolitan Street Railway Co., and for twelve years was active in the development of street railways in Manhattan. He was a member of the American Society of Civil Engineers.

Society Calendar

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; annual convention, Cleveland, Ohio, July 9-11.

AMERICAN WELDING SOCIETY, New York; fall meeting, Chicago, Sept. 22-27.

NATIONAL SAFETY CONGRESS, Chicago; annual meeting, Pittsburgh, Pa., Sept. 29-Oct. 3.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION, Pittsburgh, Pa.; 38th annual meeting, Montreal, Canada, June 26-28.

NEW ENGLAND WATER WORKS ASSOCIATION announces that the committee appointed to nominate officers for 1930-31 reports as follows: for president, George H. Finneran, superintendent, water service, Boston, Mass.; vice-president, Richard H. Ellis, superintendent, board of public works, North Andover, Mass.; for treasurer, Albert L. Sawyer, water register, Haverhill, Mass. (renominated). Independent nominations may be sent to the secretary before July 15. Election will be by letter ballot, and the votes will be opened and counted at the annual convention in September.

Construction Equipment and Materials

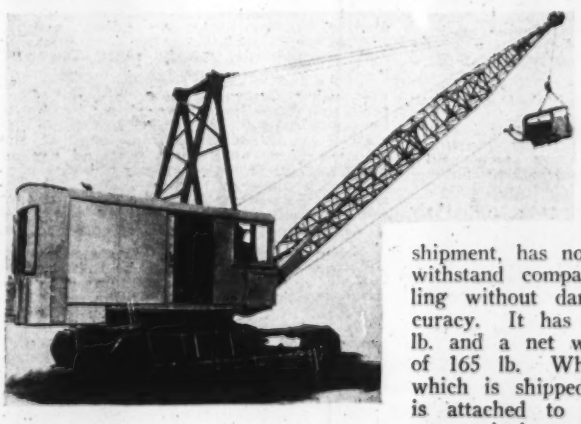
Gypsum Producers Organize

The Gypsum Association, a recently organized association of gypsum manufacturers, announces the opening of offices at 211 West Wacker Drive, Chicago. The activities of the association will be largely promotional work with architects, engineers and builders on the uses of the various gypsum products entering into standard building construction. An engineering department will be maintained that will co-operate with building commissioners in the preparation of building codes. Henry J. Schweim, development engineer of the United States Gypsum Co., has been appointed acting secretary and chief engineer, and W. J. Fitzgerald, traffic manager of the former Gypsum Institute, will serve in the same capacity in the new organization.

New Developments

2-Cu.Yd. Dragline Equipped for Soft Ground Conditions

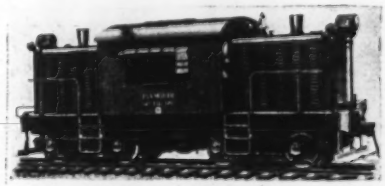
In answer to the need for a large mobile dragline for drainage and general construction work, the Northwest Engineering Co., Chicago, Ill., has announced a machine of this type which handles a 2-cu.yd. bucket on a 50-ft. boom at a 40-ft. radius and is equipped with crawlers 17 ft. 5 in. long and treads 33 in. wide. This gives sufficient bearing area to carry the machine over extremely soft going. A 200-gal. gasoline tank assures an ample fuel supply. The power plant is the Northwest variable-speed motor, accelerator controlled. Clutches are shifted through the feather-touch control, all high-speed shafts are mounted on ball bearings, the drive from the engine is through helical gears mounted on ball and roller bearings and running in oil, and positive traction even when turning assures easy maneuvering. In spite of its size this machine can be loaded on standard flat cars with no major dismantling.



LARGE CRAWLERS ON DRAGLINE REDUCE GROUND PRESSURE

Locomotives Use Electric Drive

Typical of the new line of gas-electric and oil-electric locomotives recently announced by the Fate-Root-Heath Co., Plymouth, Ohio, is the 50-ton gas-electric unit illustrated. The frame is built of 15-in. I-beams and 9-in. girder beams with cast-steel bumpers and bolsters. It is mounted on two four-wheel, spring-equalized trucks and is equipped with two six-cylinder engines, one at each end, developing 350 hp. at 1,000 r.p.m. Electrical equipment, which includes two 105-kw. 500-volt

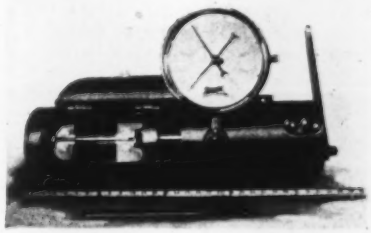


50-TON GAS-ELECTRIC LOCOMOTIVE

d.c. generators and four 110-hp. motors (two mounted on each truck), is supplied by the Westinghouse Electric & Manufacturing Co. All controls are centered at a single operating station. Westinghouse and straight automatic air brakes are standard equipment. The locomotive has a tractive force of 33,000 lb. at 2 m.p.h. and a maximum speed of 36 m.p.h.

Portable Machine Tests Welds

A portable machine for making tensile tests of welded joints which is equally adaptable to laboratory or field work has been developed by the Southwark Foundry & Machine Co., Philadelphia, Pa., in collaboration with the Union Carbide & Carbon research laboratories. The machine, in form, is a cylinder 28 in. long by 6¾ in. in diameter, which, when closed for shipment, has no projections and will withstand comparatively rough handling without damage or loss in accuracy. It has a capacity of 40,000 lb. and a net weight, including dial, of 165 lb. When testing, the dial, which is shipped in a separate case, is attached to the cylinder, a test coupon is inserted in the wedge grips and load is applied by means of a hand-operated piston type pump built into the end of the cylinder. The detachable handle used in this operation is carried inside of the case. Total load is indicated directly on an 8½-in. Emery dial



TESTING WELD IN PORTABLE MACHINE

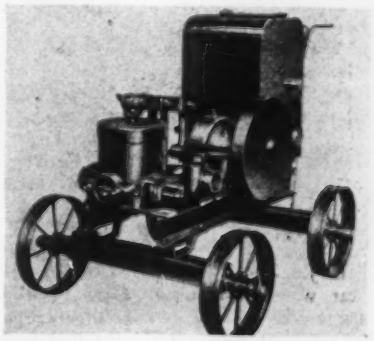
with zero adjustment and maximum hand. Modified models of the machine are available for testing 8-in. gage length specimens, and also as a compression machine for making bend tests on welds and for testing concrete cylinders.

Tractor Shovel Attachment Made in Several Sizes

Announcement has been made by the Miami Trailer-Scraper Co., Troy, Ohio, that its front-end shovel for Caterpillar tractors, described in *Engineering News-Record*, April 17, 1930, p. 671, is now being made in three sizes for use with Caterpillar tractor models 10, 15 and 20. Capacities of these units are 8 cu.ft., ½ cu.yd. and ¾ cu.yd., respectively. The shovel, which is dumped by means of a rope and winch, is interchangeable with the Miami bulldozer, backfiller or wheel scraper.

Two Rubber Rings Used to Seal Plunger Pump

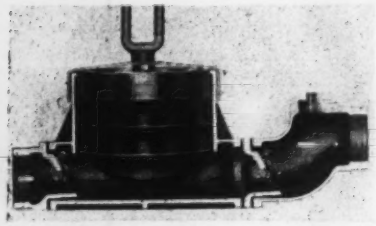
No diaphragm, packing or oil seal is used in a radically different type of plunger pump which has been designed, tested and placed on the market by the Novo Engine Co., Lansing, Mich. This is known as the roller ring plunger pump, has a capacity varying from 3,500 to 5,000 gal. per hour and develops a 100-ft. head. It is compact and light, weighing only 960 lb. The standard mounting is a four-wheel truck, but for



PUMP UNIT ON FOUR-WHEEL TRUCK

high-speed hauling, the pump may be obtained on a two-wheeled coil spring trailer equipped with rubber tires.

The plunger of the pump is equipped with two rubber rings, fitting in piston slots, which press against the cylinder wall and maintain a liquid-tight water-seal. The rolling action of these rings prevents wear, which permits the use

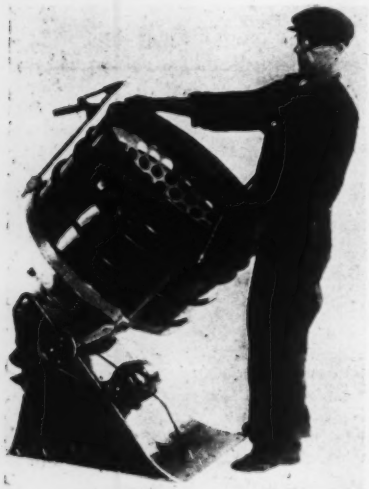


PLUNGER SECTION, SHOWING RUBBER RING SEAL

of a single set for an entire season's work without change. The plunger is operated at a high speed, 120 strokes per minute, forcing water through the pump at high velocity and thus permitting it to carry along a great deal of foreign material or sediment. This action is facilitated by the straight-line flow from suction inlet to discharge. The rapidity of the stroke also creates a more constant and uniform flow of water.

Motor-Driven Screen Tests Coarse Materials

Application of power drive to the testing of coarse aggregates is accomplished in the Weston testing screen, invented and designed by a producer of crushed stone and now being manufactured by the Hendrick Manufacturing Co., Carbondale, Pa. This consists of a set of sieves 30 in. in diameter with sides 4½ in. high and cone-shaped bottoms. These are nested together and clamped on a cone-shaped casting with a hollow center which passes fines coming through the bottom sieve to a container set in back of the machine. Openings in the sieves may be of any size from ¼ in. round or square up to whatever limit is desired. Each unit weighs approximately 15 lb. when empty and will hold about 25 lb. of material. The whole assembly is rotated at a speed of 13 r.p.m. by a ½-hp. a.c. or d.c. motor driving through an endless V-belt, a worm and a wheel. It is claimed that tests made with the Weston screen are as accurate as those made by the hand method and can be made much more quickly.



ASSEMBLING MOTOR-DRIVEN TESTING SCREEN

Costs and Contracts

E. N.-R. Index Numbers

Cost			Volume		
June 1, 1930	203.36	May,	1930	354
May 1, 1930	205.86	April,	1930	320*
June 1, 1929	205.65	May,	1929	395
Average, 1929	207.02	Average,	1929	317
Average, 1928	206.78	Average,	1928	287
1913	100.00	1913		100

*Revised.

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of June 26, with some comparisons, total as follows:

(In Thousands of Dollars)

	June 26, 1930	Average Last Four Weeks 1930	1929
Buildings:			
Industrial	$8,119	$7,342	$11,301
Other	38,926	29,800	42,418
Streets and roads	13,829	17,707	18,366
Other eng. constr.	11,581	20,916	10,456
Total	$72,455	$75,767	$82,541
Total, all classes Jan. 1 to June 26:			
1930			$1,851,711
1929			2,239,925

Business Notes

AMERICAN ROAD BUILDERS' ASSOCIATION, Washington, D. C., is planning an educational exhibit for the American Fair, to be held in the Atlantic City Auditorium from July 17 to Aug. 27. Models of road-building machinery are being solicited from members of the manufacturers division of the association.

HERCULES MOTORS CORP., Canton, Ohio, has appointed the Automotive Products Co., of London, England, sole distributor for Great Britain and continental Europe, exclusive of Russia, for Hercules engines and power units. The Automotive Products Co. maintains branch offices at Berlin and Vienna.

BLAW-KNOX INTERNATIONAL CORP., New York City, is the new name of the export organization of the Blaw-Knox Co., Pittsburgh, Pa., which was formerly known as Milliken Brothers-Blaw-Knox Corporation. The change of name embraces no change in personnel.

PREST-O-LITE CO., INC., New York City, has opened a new plant for the manufacture of dissolved acetylene in Atlanta, Ga.

CONTINENTAL MOTORS CORP., Detroit, Mich., has appointed W. N. Fitzgerald, Jr., to the sales department of its industrial division.

AEROIL BURNER CO., INC., West New York, N. J., has opened a Pacific Coast office and warehouse at San Francisco, Calif., in charge of R. M. Starner.

A. M. BYERS CO., Pittsburgh, Pa., has appointed H. W. Rinearson vice-president in charge of sales, succeeding L. M. Johnston, who has resigned. Mr. Rinearson was formerly vice-president and general manager of the Armco Culvert Manufacturers Association. H. R. Rowland, formerly Pittsburgh district sales manager, has been advanced to the post of division manager, with headquarters in Philadelphia.

BUHL COMPANY, Chicago, Ill., has appointed George C. Theall manager for the Eastern district, with headquarters in New York City.

DAVIS REGULATOR CO., Chicago, Ill., has moved all departments to a new factory building at 2541 South Washtenaw Ave. The company, which was formerly known as the G. M. Davis Regulator Co., has dropped the initials from before its name.

HERCULES POWDER CO., Wilmington, Del., has appointed H. V. Chase assistant director of operations of its explosives department. Mr. Chase was formerly superintendent of the company's plant at Kenvil, N. J., which is now in charge of W. S. Brimijoin as superintendent.

LUKENS STEEL CO., Coatesville, Pa., has formed a subsidiary company known is Lukenweld, Inc., for the purpose of supplying welded steel construction to manufacturers of machinery and equipment. An extensive program of development and research work will be carried on. G. D. Spackman is president of Lukenweld, Inc.

TUBE-TURNS, INC., Louisville, Ky., is adding to its plant and equipment in order to increase its production capacity by 60 per cent. It is expected that the new facilities will go into production about Aug. 1.

New Publications

Iron—Radio talks broadcast by the Armco Iron Master, telling the story of the iron and steel industry, have been reproduced in printed form in a 52-p. illustrated booklet issued by the AMERICAN ROLLING MILL CO., Middletown, Ohio.

Bronze—Facts about Duronze, an alloy which, it is claimed, combines the high strength of carbon steel with the ductility of copper and the endurance of bronze, are given in a 10-p. illustrated booklet issued by the BRIDGEPORT BRASS CO., Bridgeport, Conn.

Steel Joists—Improved Havemeyer steel joists, which are now made by welding together specially designed twin-tee hot-rolled shapes as top and bottom chords with plain round bars as web members, are described in a 24-p. illustrated booklet issued by the CONCRETE STEEL CO., New York City. Design instructions, specifications and load tables for use in steel joist floor construction are also included.

Locomotives—Photographs and performance data relating to industrial locomotives are given in a 32-p. booklet issued by the HEISLER LOCOMOTIVE WORKS, Erie, Pa. Records are included showing total hauling costs, fuel consumption and track locomotive maintenance costs on a number of jobs. The booklet also contains information relating to proper track rating, computation of required power for given loads, and directions for measuring curves and grades.

Electrical Construction—A handbook has been issued by the ELECTRICAL ASSOCIATION OF NEW YORK, INC., 100 East 45th St., New York City, containing twelve sections covering each of the following classifications: illumination, industrial control, industrial heating, material handling, motors, refrigeration, signals, signs, switchboards and panelboards, tools, ventilation and wiring.

Painting Cement—"How to Paint Concrete and Masonry Surfaces," a 20-p. booklet published by the MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, tells of the characteristics of Medusa portland cement paint and gives directions for painting concrete and masonry surfaces. Various sections of the book take up the use of cement paint in industrial and railroad work and in other types of engineering construction.

Motor Truck Operation Costs—Results of a questionnaire sent out to motor truck owners in all parts of the country by the GENERAL MOTORS TRUCK CO., Pontiac, Mich., are given in a 44-p. bulletin recently issued. Facts and figures on truck operating, maintenance and depreciation costs, the use of special hauling equipment, methods of compensating drivers, and other matters in connection with the operation of more than 46,000 trucks of various makes are analyzed and compared in respect to various services. Among the businesses considered are those of general and road contracting and general haulage.

Unit Prices From Current Construction Bids

Concrete Viaduct 2,400-Ft. Long Over Two Railways and the Los Angeles River

THE city of Los Angeles will construct a reinforced-concrete viaduct and approaches in East Fourth St., across the Union Pacific Railroad tracks, the Los Angeles River, and the Atchison, Topeka & Santa Fe tracks, and in East Fourth Place (see elevation below). The Fourth St. viaduct is 2,400 ft. long and 71 ft. wide with 56-ft. roadway. The river is crossed by a single arch 254 ft. long with girder and arch approaches and a 600-ft. ramp. The work includes: (1) fills for the approaches and for the viaduct; (2) curbs, gutters, sidewalks; (3) ornamental railings, pylons, lighting standards, bronze lanterns; (4) storm drains; (5) sanitary sewers; (6) pavements. The contract was awarded in April, 1930, to Fisher, Ross, McDonald & Kahn for $1,246,635; this was $16,126.85, or 1.3 per cent, more than the engineer's estimate.

Concrete—Compression test for cement (mortar cylinders) is 2,000 lb. for seven days, and 2,700 lb. for 27 days. Sand may contain up to 3 per cent mica and 5 per cent silt or clay, and 93 to 100 per cent must pass ¼ in., and 60 to 85 per cent must pass a 10-mesh. The contractor provides four bins for rock: (1) for pea gravel; (2) for ¼- to 1-in.; (3) for 1- to 1½-in.; (4) for either rock or sand. Maximum size of rock for concrete is 1½ in. except in massive portions of the structure, where up to 2½ in. may be permitted. Concrete is of three classes as follows:

Class	Cement, Sack	Sand, Cu.Ft.	Rock
D	1	4	8
F	1	2	3
H	1	2¼	2¼

In Class H, calcium chloride solution may be used as an admixture to the water in amount equal to from 3 to 5 pints per sack of cement, according to the reaction. This concrete is used in the construction of handrail and lighting standards and in the ornamental pylons on Abutments 3 and 4 above sidewalk level. Class D is for backfill. Class F (largest quantity) is for all other portions of the structure, including concrete piles.

The mixing plant must be capable of producing 500 cu.yd. per eight-hour day. Time of mix is 90 seconds. Sand and rock are measured by weight except for piles, street work, rail, standards and pylons. Transportation may be by overhead cableway, industrial railway, towers and chutes, or buggies, but the concrete must be deposited in a deck hopper before placing. No concrete is placed under water. Exposed concrete is protected from sun and wind for ten days by covering with sand, earth or burlap and is kept wet.

The concrete piles may be either precast or cast in place. The contractor determines the length by driving timber piles, for which he is paid $1.50 per linear foot of pile in place below cutoff elevation of concrete piles. In place, piles may be cast in removable shells or in light-gage corrugated shells left in place. For piles with removable shells, the concrete has a 1-in. slump test. Bids are based on 15-ft. lengths.

Abutments, Piers and Footings—Abutments carrying slab or girder spans are completely filled (except No. 5, which has no fill) before the adjoining slab or girder spans are poured. Fill on the outside of Abut. 5 is completed to grade before pouring the adjoining girder spans. Fill back of Abut. 4 (west bank of Los Angeles River) is completed before placing fill within the abutment cells. The specifications contain a complete schedule for concreting the arches.

The 254-Ft. River Span—The columns are poured to the soffit of the deck girders, and not less than 24 hours may elapse before the deck is poured. The entire roadway section, including sidewalk beams but not curbs and sidewalk slabs, between transverse expansion joints is cast in a continuous operation. Each section of the superstructure is poured with the aim of continuously balancing the loads about the crown, and the sequence is as follows: (1) crown section except the panel over the crown hinges; (2) haunch sections, both sides, from abutments to construction joints; (3) remaining portions of haunch sections; (4) center panel of crown section, which is poured after crown hinges have been concreted in. Following the concreting of the sections, the curb and sidewalk slab on either side is poured continuously between transverse expansion joints and along the construction joint.

Approach Girder and Slab Span—Forms are used for all footings, and the footings for each pier are poured in one working day. The shaft of each pier is constructed of horizontal layers on consecutive working days, each layer being finished before another is started. After pouring pier columns to springlines of arches, 24 hours must elapse before pouring the upper section of the piers or the cross-girders.

Where girder or slab spans join arch abutments, the latter and the adjoining arches are completed, including fills, before pouring the girders. At least half the railway section, including the longitudinal girders, cross-girders and brackets, are cast in a continuous pour between expansion joints.

EAST FOURTH ST. VIADUCT, LOS ANGELES

Between the transverse expansion joints, the sidewalk slab and the curb may be cast separately along the construction joints. Ceilings in the bays over the railway track are constructed before any of the main floor or girders in these bays are cast. Forms are removed under the roadway slab between the south highway and south sidewalk girders. Forms under other roadway slab sections may be left in place. The railways will paint the spans over their tracks or otherwise protect these spans from locomotive blasts.

Retaining Walls are constructed in two operations: (1) each section of footing course; (2) entire vertical wall in each portion above footing between expansion joints, except when height is more than 15 ft., when a second pouring operation is permitted.

Crossing Two Railways—The viaduct passes over the yards and main-line tracks of the Union Pacific system and the Santa Fe railway. To maintain traffic with minimum interruption all plans for arch centering or systems of supporting shores or falsework will be approved by the railway concerned. It is expected that the contractor will construct that portion of the viaduct across the Santa Fe yard, beginning with Abut. 4 on the west bank of the Los Angeles River and, working west, first erect all piers and abutments with not more than one of either under construction at a time, and then construct the deck in a series of not more than three spans per operation. Over the U. P. tracks the arch centering is supported on the faces of the piers, but will have only one intermediate row of column supports in any one arch span. The specifications include a detail schedule of track changes and temporary connections that will be made by the railway companies for handling traffic during the construction of the piers and abutments.

Basis of Payment—The bids are a combination of lump sum and unit prices and are given in full in the tabulation.

(A) A lump sum for arch centers complete, to remain property of contractor.

(B) Lump sum for steel reinforcement in place (7,000,000 lb.), including dowels for handrails and pylons embedded in the structural portion of the viaduct at sidewalk level, but not including steel above that level because of inclusion of this item in ornamental handrails and pylons complete in place. Any additional reinforcing will be paid for at 5c. per pound, including contractor's profit.

(C) Price per cubic yard of concrete in place for Classes

	A	B	C	D	E	F
Arch centers (lump sum)	$54,925.00	$40,000.00	$40,000.00	$53,000.00	$38,000.00	$115,000.00
Reinforcing steel in place (lump sum)	230,000.00	250,000.00	280,000.00	214,000.00	208,000.00	240,000.00
44,200 cu.yd. Class F conc.	15.50	16.25	15.60	16.70	18.50	19.85
1,000 cu.yd. Class D conc.	10.00	5.00	15.00	10.00	12.00	7.50
Reinforced-concrete piles:						
Precast piles	33,700.00	25,000.00	26,940.00	23,000.00	26,940.00	32,000.00
Cast-in-place piles	33,700.00	25,000.00	30,981.00	26,000.00	26,940.00	25,000.00
Reinforced-concrete piles in place, a price per lin.ft. for increase in length (not to exceed $2.50)			2.50			
Precast piles		2.50	2.50	2.50	2.50	2.50
Cast in place piles		2.50	2.50	2.50	2.50	2.50
Reinforced-concrete piles in place, a price per lin. ft. for decreases in length (not less than $1.50)			1.50			
Precast piles		1.50	1.50	1.50	1.50	2.00
Cast-in-place piles		1.50	1.50	1.50	1.50	1.75
6,150 lin.ft. cement curb in place	0.665	0.80	0.60	1.34	0.75	0.45
Grading (lump sum)	37,860.00	40,000.00	40,000.00	48,000.00	30,165.00	43,000.00
7,750 sq.ft. conc. gutter	.262	.30	.25	.34	.25	.25
34,700 sq.ft. cement sidewalk	.127	.20	.15	.138	.16	.15
Extending and remodeling sanitary sewers and storm drains	23,920.00	25,000.00	35,000.00	31,000.00	21,900.00	27,000.00
Pavements in place	35,730.00	30,000.00	37,000.00	44,000.00	36,000.00	36,000.00
Ornamental handrails and pylons complete in place	44,084.00	36,000.00	38,000.00	55,000.00	44,000.00	40,000.00
Lighting standards, ornamental lighting units and appurtenances except dome refractors, complete in place:						
Using bronze lighting units and appurtenances	73,700.00	66,000.00	80,000.00	76,000.00	65,000.00	65,000.00
Using aluminum lighting units and appurtenances	73,700.00	62,000.00	78,000.00	72,000.00	62,000.00	64,250.00
Transformer vault and 3-in. fiber conduit, complete in place	962.00	1,200.00	900.00	1,300.00	1,500.00	1,100.00
Totals	$1,230,508	$1,246,635	$1,291,193	$1,306,635	$1,310,307	$1,493,180

F and D, not including concrete in piles, transformer vault or outside of the line of the work. Prices include forms, excavation, backfilling, shoring and pumping.

(D) Lump sum for reinforced-concrete piles in place. Alternate bids asked for precast and cast in place.

(E) Price per linear foot of piles in place, to be used for increases ordered by engineer and price for decreases in length of piles ordered. Price for increases not to exceed $2.50 and for decreases not less than $1.50 per linear foot.

(F) Lump sum for grading, including all excavation and fill for street work and finished grading.

(G) Price per linear foot for cement curb in place; price per square foot for concrete gutter in place, and per square foot for cement sidewalk. This street work is not part of the structure.

(H) Lump sum for constructing and remodeling sanitary sewers and storm drains.

(I) Lump sum for construction of pavements and removal of existing pavement which interferes with the construction of new.

(J) Lump sum for ornamental handrails and pylons.

(K) Lump sum for lighting standards, ornamental bronze lighting units. Alternate bids asked on aluminum lighting units.

(L) Lump sum for transformer vault and 3-in. fiber feed conduit complete in place.

The tabulation lists the bids of the engineer and the five bidders: (A) Engineer's estimate; (B) Fisher, Ross, McDonald & Kahn, Spring Arcade Bldg. (contract); (C) General Engineering Corp., Stock Exchange Bldg.; (D) Clinton Construction Co.; (E) Torson Construction Co.; (F) Bent Brothers, Inc.

Highway Work in California

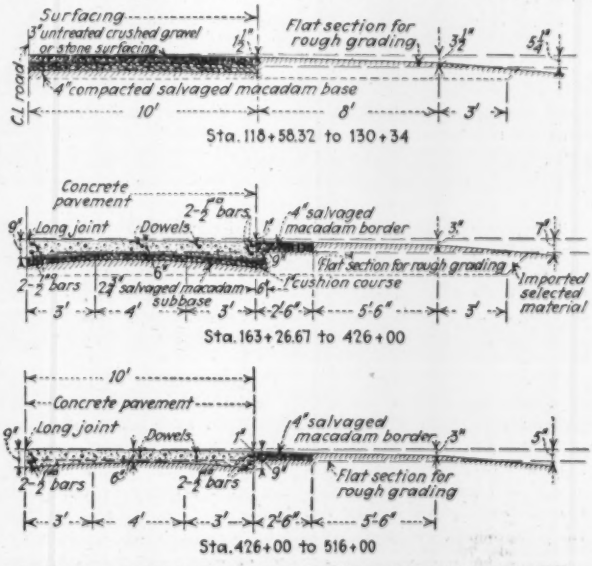
A PORTION of state highway in San Joaquin County, Calif., between Cherokee station and Harvey Lane was let in March, 1930, for $251,562.50. The site is an existing macadam pavement. Typical sections of the new road are shown herewith. The principal items are excavation, concrete, and corrugated metal pipe, furnished by the state. Briefly, the work is a graded roadbed 36 ft. wide with concrete pavement and untreated crushed gravel or stone surfacing. In detail: from station 163+35 to station 516+00, concrete pavement 20 ft. x 6 to 9 in.; station 118 to station 130+40, surfacing 20 ft. wide of 4-in. salvaged macadam base and a 3-in. surface course of untreated gravel or stone; station 163+35 to station 426+00 a 21-ft. salvaged macadam base 2¾ in. with 1-in. cushion course. Salvaged macadam borders 2½ ft. x 4 in. are on both sides of the concrete pavement.

Material for embankment in excess of that available by roadway excavation is obtainable free from a diverting canal one mile north of Stockton. Imported selected material, available at the canal, is sandy silt having a linear shrinkage of not more than 3 per cent.

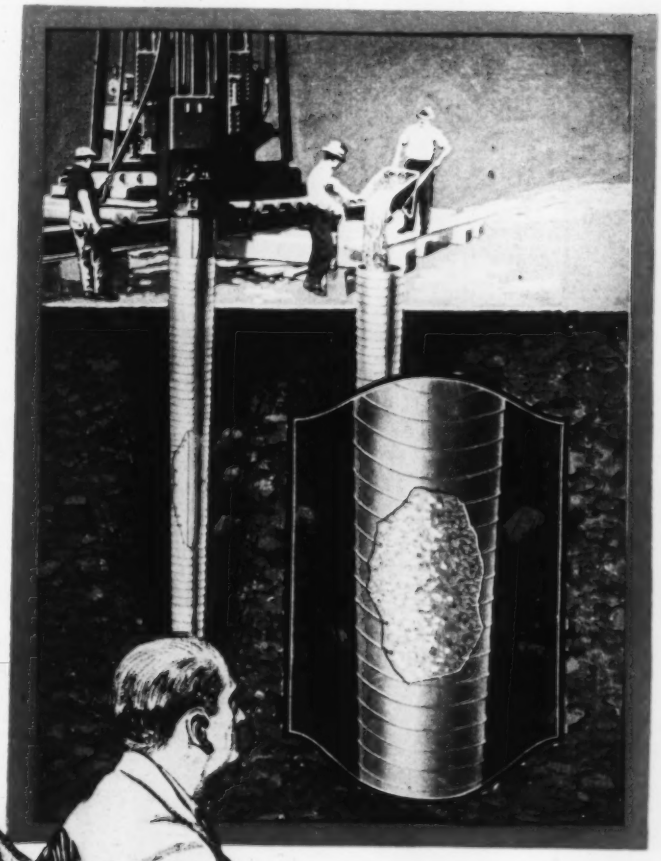
The earth shoulders on each side of the roadbed from the edge of the untreated surfacing and the borders is treated with a heavy fuel oil spread in four applications at the rate of ½ gal. per square yard at each. After each of the first three applications the shoulders are harrowed and bladed until the oil is uniformly mixed to a depth of 3 in. After the final application the shoulders are dragged and shaped to a smooth surface. The price of the oil is laid.

More than half of the cost of this project is in class A concrete. This mix has six sacks of cement per cubic yard.

The tabulation lists the unit prices of the lowest two bidders, which were: (A) T. M. Morgan Co., Los Angeles, $251,562.50 (awarded contract); (B) C. W. Wood, Stockton, $259,579.70.

	A	B
47,800 cu.yd. roadway excav. unclass.	$0.32	$0.25
33,400 cu.yd. borrow	0.55	0.50
34,500 cu.yd. imported selected material	0.57	0.75
44,200 sta.yd. overhaul	0.02	0.02
3,060 cu.yd. structure excav.	0.70	0.75
9,200 cu.yd. salvaged macadam	1.10	1.00
2,000 tons untreated crushed gravel or stone surf.	2.25	2.00
100,000 gal. water applied to surfacing	2.00	1.00
19,840 sq.yd. subgrade for pavement	0.08	0.08
1,610 cu.yd. cushion course	1.00	1.00
15,000 cu.yd. Class "A" concrete	9.40	10.00
383,000 lb. bar reinf. steel	0.0484	0.05
222 lin.ft. 12-in. corr. metal pipe	0.50	0.50
2,144 lin.ft. 18-in. corr. metal pipe	0.65	0.50
1,003 lin.ft. 24-in. corr. metal pipe	0.75	0.50
20 lin.ft. 30-in. corr. metal pipe	1.25	1.00
1,339 lin.ft. corr. metal pipe (clean and relay)	0.75	1.00
240 lin.ft. solid timber guard rail	0.85	1.50
4.6 mi. new fences	375.00	400.00
9.2 mi. moving and resetting fences	250.00	300.00
21 moving and resetting conc. headwalls	12.00	8.00
2,180 bbl. fuel oil for shoulders	2.00	2.00
362 sta. finishing roadway	8.00	5.00
77 monuments in place	3.00	3.00

TYPICAL CROSS-SECTIONS ON SAN JOAQUIN COUNTY (CALIF.) HIGHWAY CONTRACT

"...you see the Raymond Steel Shell is vitally necessary..."

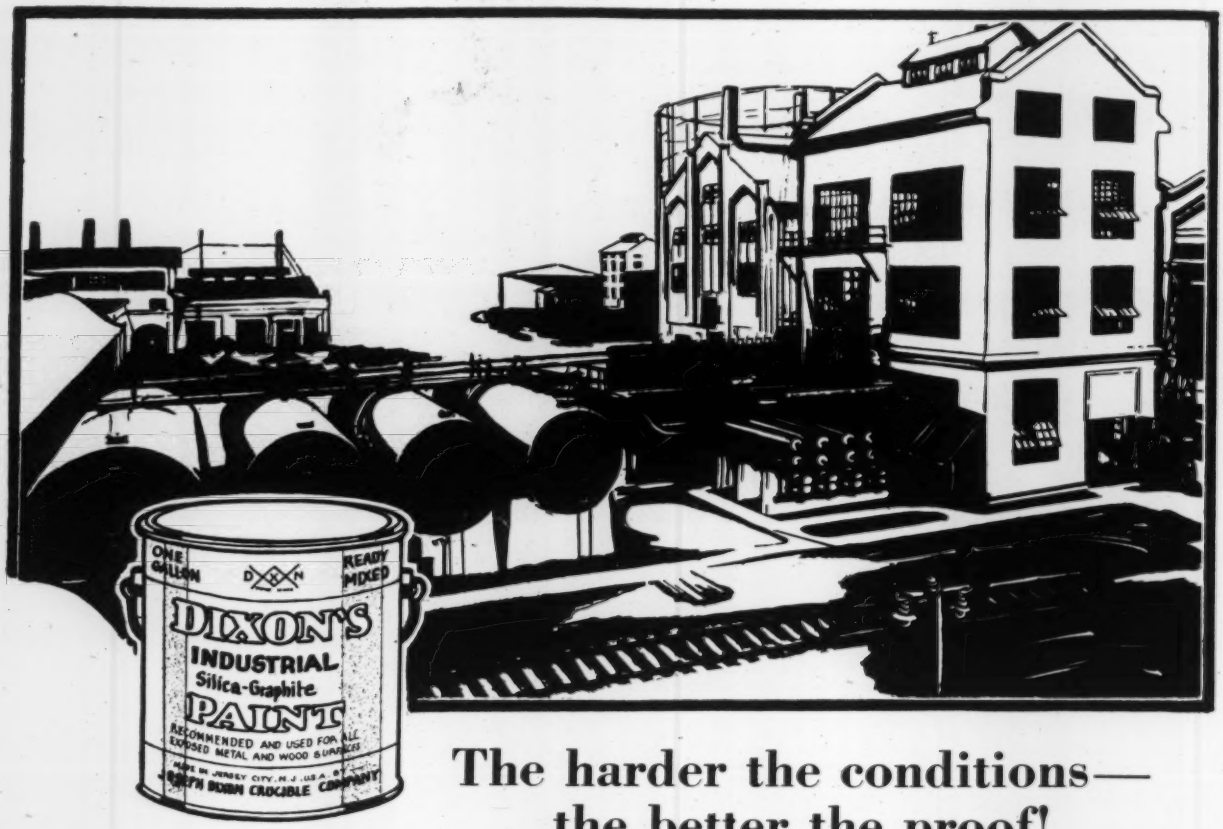


RAYMOND
CONCRETE PILES

are often placed through dangerous earth strata, and in the region of heavy earth and hydrostatic pressure. That is why the Raymond tapered reinforced steel shell is first driven, then left in place on each "green" concrete pile to protect the pile column and to maintain the developed resistance.

RAYMOND CONCRETE PILE CO.

NEW YORK: 140 Cedar St. CHICAGO: 111 West Monroe St.
Raymond Concrete Pile Co., Ltd., Montreal, Canada
Branch Offices in Principal Cities



The harder the conditions— the better the proof!

Some paints prove themselves quickly—too quickly for economy. And some paints stand up well—under easy conditions.

But Dixon's welcomes hard conditions—high temperatures, low temperatures, hail, rain, smoke, dust—because under such conditions the true economy and protective qualities of Dixon's Industrial Silica-Graphite Paint are best demonstrated.

Dixon's Industrial Paint is naturally longer lived and of greater resistance to destructive elements. Its basic pigment is flake silica-graphite. The silica and graphite are integral. Each has a distinct advantage, the silica adding strength and durability to the graphite flakes which are "water-repellent," as well as resistant to corrosion.

There is no secret about Dixon's Industrial Paint—nor why it proves its value under difficult conditions. Write for records of long service and Color Card No. 227BI.

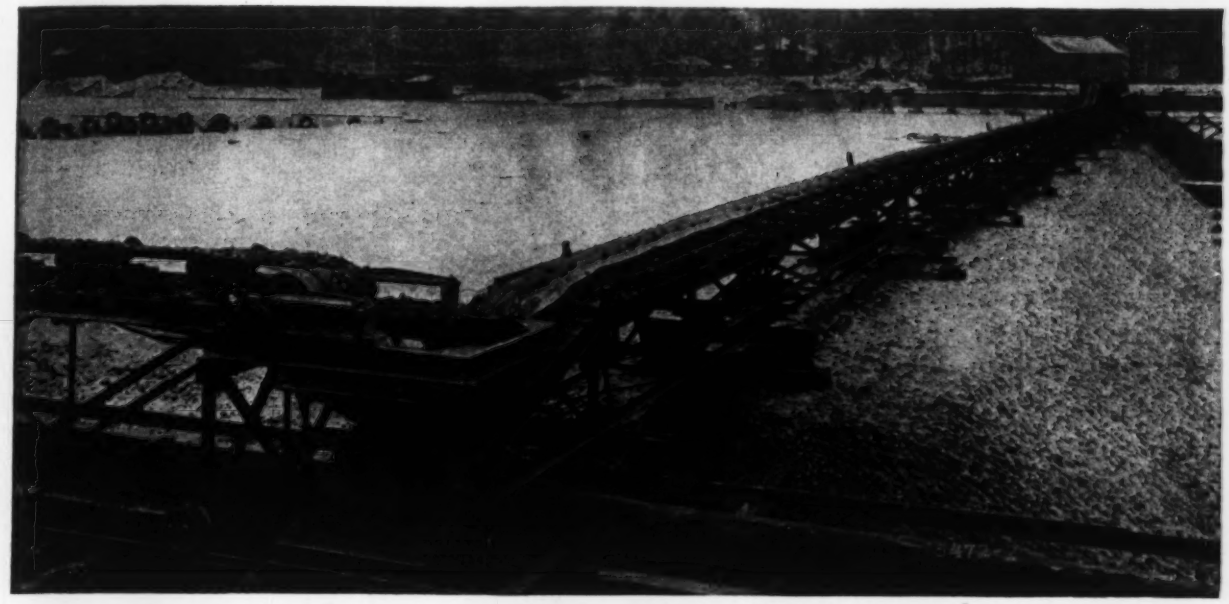
PAINT SALES DIVISION

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827

JERSEY CITY - - D X N - - NEW JERSEY

DIXON'S INDUSTRIAL SILICA GRAPHITE PAINT



Spreading a Sea of Crushed Rock

A mountainous quantity of rock had to be spread for this trickle sewage disposal plant a big job for any sort of machinery.

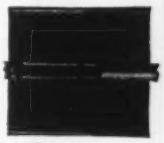
It was spread—nearly automatically—leveled perfectly by two Jeffrey Belt Conveyors, one equipped with a traveling tripper.

A longitudinal Belt feeds to a cross belt—all mounted on tracks to permit forward movement as filling progresses. The traveling tripper, operating from the cross belt, drops the rock just where it is wanted. The fill progresses evenly.

Economical—efficient—rapid—it would be difficult to improve upon this method. Where a great fill is to be made—a hill to be removed—or where any quantity of bulk material is to be moved—consider the Jeffrey Belt Conveyor. Often it will give greater economy.

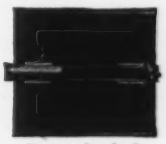
Jeffrey Belt Pulleys defy hard, gritty service. They are provided with pressure grease gun fittings and recessed grease pockets that store lubricant for a considerable run and prevent formation of hard buttons in grease holes, which might hamper flow of lubricant. Three types of bearings as shown.

A Belt Pulley for Every Need



Plain Bearing

Roller Bearing



Bronze-bushed Bearing

THE JEFFREY MANUFACTURING COMPANY

923-99 North Fourth St., Columbus, Ohio

New York Buffalo Rochester, N. Y. Utica Philadelphia Pittsburgh Scranton, Pa. Boston Cincinnati Cleveland Detroit Chicago Milwaukee St. Louis Denver Salt Lake City Birmingham Houston Charleston, W. Va.

Jeffrey Manufacturing Company, Ltd., of Canada, Head Office and Works, Montreal; Branch Office, Toronto

JEFFREY PRODUCTS

Chains and Attachments
Sprocket Wheels—Gears
Elevators—Conveyors
Trolley Conveyors
Portable Loaders
Coal and Ashes Handling Equipment
Crushers—Pulverizers
Sand and Gravel Handling, Washing and Screening Equipment
Locomotives

JEFFREY

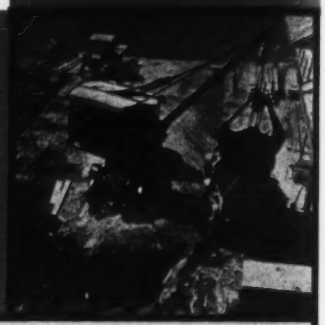
MATERIAL HANDLING EQUIPMENT

The UNIVERSAL *Truck Crane Says it in Dollars and Cents*

TRAVELING from job to job at motor truck speed the Universal Truck Crane can easily serve a territory of 50 to 125 mile radius, a territory which in the average community is full of profitable crane jobs. The illustrations and figures here tell the story. More facts will be sent you on request.

THE UNIVERSAL CRANE COMPANY
LORAIN, OHIO

$450.00 earned in 5 days. The job was a garage basement excavation where both trucks and cranes worked from the top.



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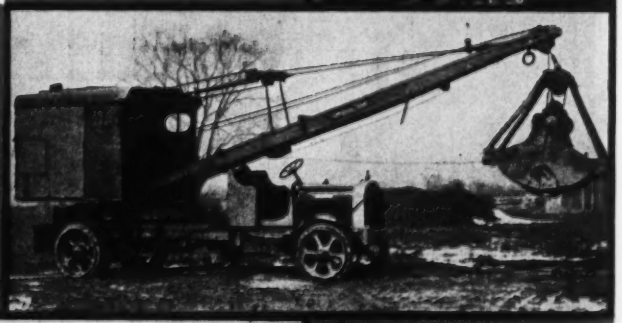
A 7½ ton capacity crane with 24 ft. boom and ½ yard clamshell that earned $1379.34 in 25 days on 20 different jobs.



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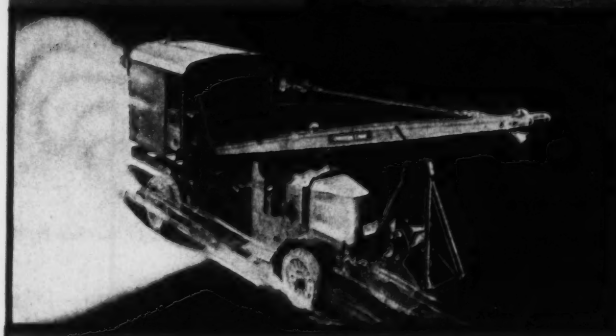
This one Universal Truck Crane earned $5511 in three months, working on jobs that required anywhere from 2 hours to 3 days. The owner has a fleet of six Universal Truck Cranes—all making money.

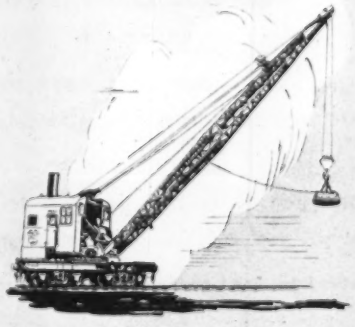
For big jobs or little, sooner or later you will need a machine that combines the mobility of a motor truck and the versatility of a 5 to 7½ ton crane.



UNIVERSAL

A CRANE FOR EVERY HANDLING NEED

THE MAN who buys a locomotive crane without investigating an Industrial Brownhoist is overlooking a half century's experience ~ ~ ~ and the most complete line of this equipment that has ever been built by one manufacturer.

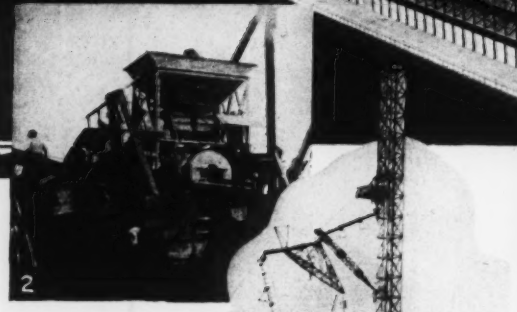


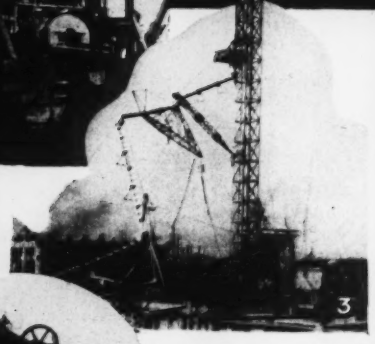
Crawler Cranes and Shovels, Locomotive Cranes, Erection Cranes, Wrecking Cranes, Bridge Cranes, Heavy Dock Machinery.

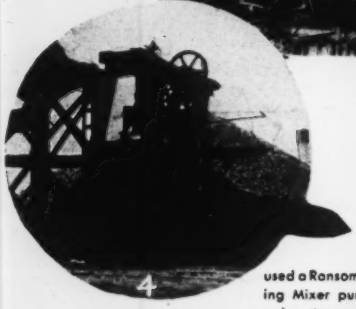
Industrial Brownhoist Corporation
General Offices Cleveland, Ohio
District Offices: New York, Philadelphia, Chicago, Pittsburgh, Detroit, New Orleans, San Francisco, Cleveland
Plants: Brownhoist Division, Cleveland; Industrial Division, Bay City, Michigan; Elyria Foundry Division, Elyria, Ohio

INDUSTRIAL BROWNHOIST

four Contractors used Ransome Equipment







—on the McComas Street Ocean Terminal in Baltimore— and finished the Job on Time!

The McComas Street Ocean Terminal is the first unit of the $50,000,000. port development program of Baltimore, Md.

This project cost $8,500,000. and took 27 months to complete. It involved the construction of a two-story concrete merchandise warehouse; two two-story wharves; a one-story pier shed; a rest house and commissary; a shop building; and yard terminal facilities having more than five miles of apron, switching and yard tracks.

Four contractors used *Ransome equipment*—as shown in the above illustrations.

The schedule was rigid. Large penalties were set for failure to meet contract completion dates. The job was done *on time.*

On large construction jobs, it is not unusual to find several contractors who use all Ransome equipment.

Folder "D" describes the entire Ransome Line. Send for your copy today.

1. Floating Plant owned by the North Eastern Construction Co. of Baltimore consisting of One 21-S Standard Building Mixer and Ransome Wood Tower, Boom and 48' Chute.

2. Merritt-Chapman & Scott Corporation of New York City & Baltimore used a Ransome 28-S Standard Building Mixer purchased in 1908. Still going strong after over 20 years!

3. P C. Streett Engineering Co. of Baltimore used a Ransome Heavy Steel Tower, Ransome 14-S and 7-S Standard Building Mixers.

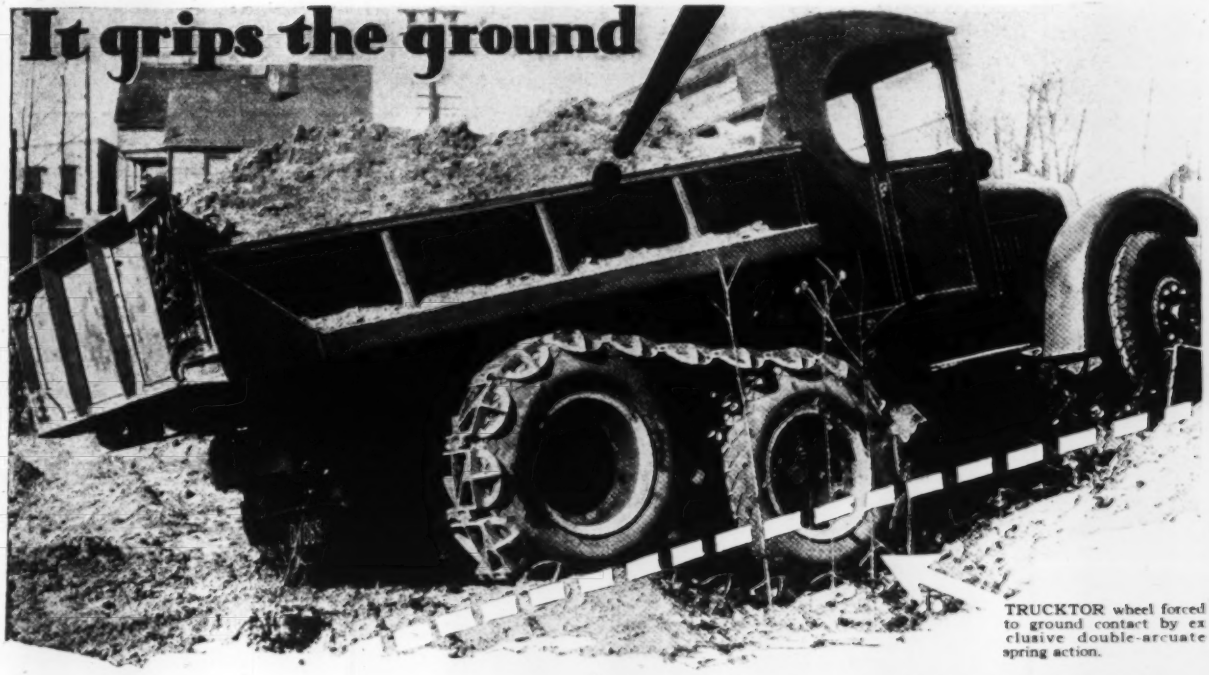
4. The Empire Construction Co. of Baltimore used a 21-S Standard Building Mixer

Ransome Concrete Machinery Company

1850 — Service for 80 Years — 1930

Dunellen **New Jersey**

It grips the ground



TRUCKTOR wheel forced to ground contact by exclusive double-arcuate spring action.

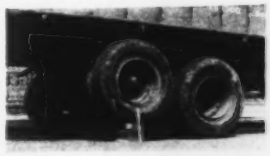
—and that means TRACTION

SEE for yourself how the TRUCKTOR wheels keep in *contact with the ground*, regardless of the roughest going. And each wheel *works independently*, in its own spring and axle. This marvelous flexibility adds greatly to the load carrying capacity, to keeping the truck level, and to the tractive power.

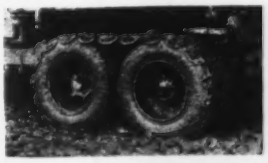
The TRUCKTOR attachment makes any 4-wheel truck a legal 6-wheel load carrier. Quickly attached to any truck, it strengthens the frame without interfering with drive or brake. The TRACK is added or detached in quick time and gives tractor performance at truck speed—*rain* or *shine*.

Remember, TRUCKTORS can be added to any new or old truck. They're cutting costs NOW for many big firms. Write for details today.

TRUCKTOR wheels may be raised over 10" without affecting tractive power of rear driving wheels.



Showing TRUCKTOR installed behind rear axle.

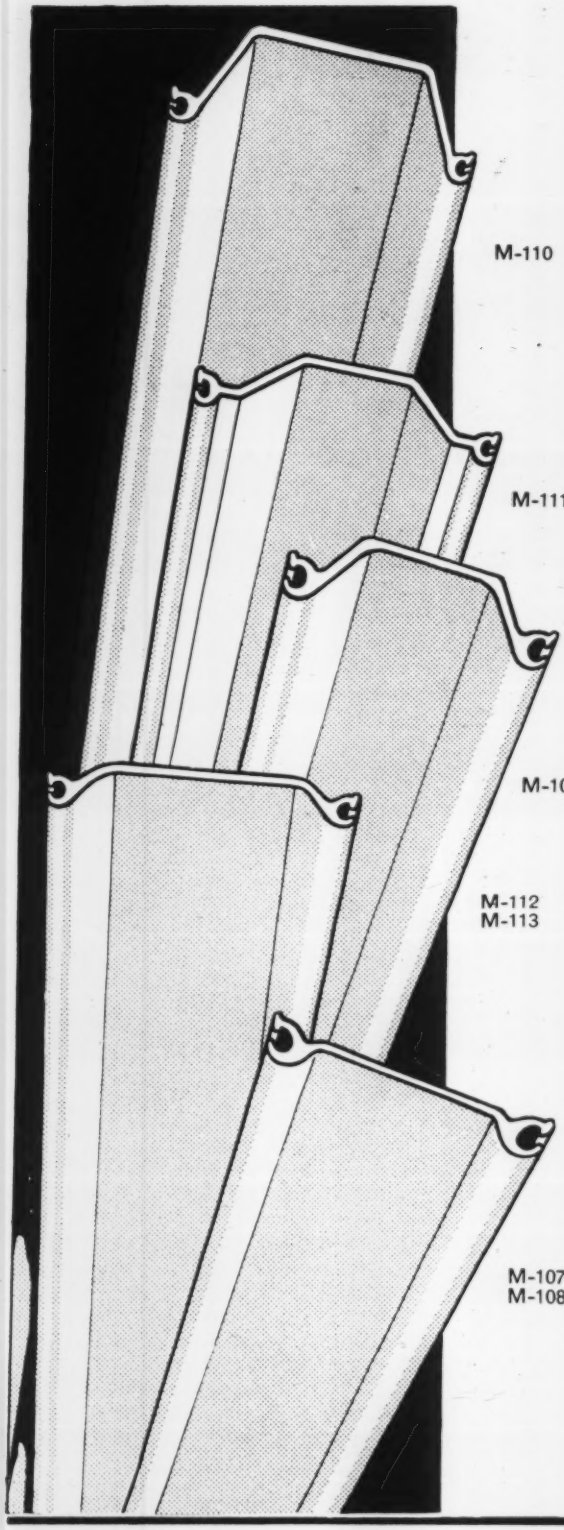


Showing TRUCKTOR supports rear end of truck in rough going.

THE TRUCKTOR CORP.
158 Wilson Ave. Newark, N. J.

TRUCKTOR

TRUCK SPEED TRACTOR PERFORMANCE



CARNEGIE
Steel Sheet Piling

WITH the recent introduction of several new sections, Carnegie Steel Company is now prepared to supply steel sheet piling eminently suitable for any driving condition. All sections are characterized by short stiff interlocks to give strength against pulling apart, yet providing sufficient clearance for ease of driving and flexibility of joints. The circuitous route which water must travel through the interlock affords opportunity for lodgment of solid materials in the interlock, insuring practical watertightness.

Our engineers are at your service and will gladly consult with you on problems involving your steel requirements.

Section	Driving Width	Web Thickness	Weight per Foot	Weight per Square Foot of Wall	Section Modulus per Single Piece	Section Modulus per Foot of Wall
M 106	14 in.	3/8 in.	36.9 lb.	31.6 lb.	10.34 in.^{3}	8.86 in.^{3}
M 107	15 in.	3/8 in.	38.4 lb.	30.7 lb.	4.10 in.^{3}	3.28 in.^{3}
M 108	15 in.	1/2 in.	42.8 lb.	34.2 lb.	4.10 in.^{3}	3.28 in.^{3}
M 110	16 in.	31/64 in.	42.6 lb.	32.0 lb.	20.34 in.^{3}	15.26 in.^{3}
M 111	16 in.	3/8 in.	29.3 lb.	22.0 lb.	7.74 in.^{3}	5.80 in.^{3}
M 112	16 in.	3/8 in.	30.6 lb.	23.0 lb.	2.50 in.^{3}	1.88 in.^{3}
M 113	16 in.	1/2 in.	36.2 lb.	27.2 lb.	3.28 in.^{3}	2.46 in.^{3}

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

56

CARNEGIE
STEEL SHEET PILING

The last dipperful

FINISHED AHEAD OF TIME AS USUAL — WITH A GAS + AIR

Time is the all-important factor on most digging jobs. Increased yardage adds dollars to the contractor's profits. He must dig big yardage every hour weather will permit.

Toughest digging doesn't put you behind schedule if a Bucyrus-Erie Gas + Air is on the job. The Gas + Air with the equivalent of a steam crowd and a steam swing maintains fast output in hardest materials. Compressed air gives a powerful cushioned crowd without robbing power from the hoist at the critical moment. It gives a fast, smooth swing, impossible with a clutch machine. And as the dipper goes up through the bank, the full power of the gas engine is available for the hoist alone.

The result — speed and steadiness of output impossible with the ordinary clutch-type machine.

Introduced only five years ago, the Gas + Air has scored a brilliant success because it finishes the hardest jobs on time. There is a Diesel + Air, too. Like the Gas + Air it is built only by Bucyrus-Erie. Investigate these machines — they will help you compete for jobs and make you bigger profits. Write today for complete specifications.

Representatives throughout the U. S. A. Offices or distributors in all principal countries. Branch Offices: Boston, New York, Philadelphia, Atlanta, Birmingham, Pittsburgh, Buffalo, Detroit, Chicago, St. Louis, Dallas, San Francisco.

A-123—6-26-30—ENR

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY, manufacturers of the only complete line—all sizes, types and powers. *Plants:* S. Milwaukee, Wis., Erie, Pa., Evansville, Ind. *General Offices:* S. Milwaukee, Wis.

A Rolling Surface Defies *Wear*

Sliding friction, which breaks down diaphragms, packings and oil seals, is completely eliminated in this new Novo Roller Ring Pump.

Two rolling rubber rings between the cylinder wall and piston make an absolutely liquid-tight seal.

And because these rings *roll* with the action of the piston, *the rings are guaranteed for a season's work without replacement.*

For All Kinds of Dewatering Jobs

Novo Roller Ring Pumps replace centrifugal, diaphragm and plunger pumps on all kinds of dewatering jobs.

They can handle more foreign matter in suspension—are self-priming, compact, light in weight and develop a 100-foot head.

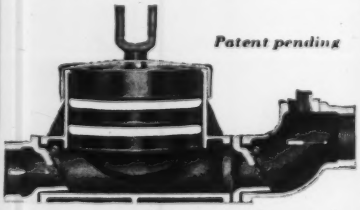
Novo Roller Ring Pumps are also furnished mounted on special rubber tired trailers with combination tongue and prop.

On certain jobs, Novo Roller Ring Pumps can replace pressure pumps. And they are ideal for handling well points.

The single, vertical pump shown above has a capacity of 4000 gallons per hour and a total head of 100 feet.

Other sizes available later will have even greater capacities.

Send the coupon for the new folder giving complete details on the many exclusive construction features—and the low cost, trouble-free pumping which can now be yours.



Note the straight line flow from suction to discharge—and the liquid-tight seal produced by the two roller rings on the plunger of the new Novo Roller Ring Pump.

NOVO ENGINE CO.
200 Porter Street, Lansing, Michigan
Clarence E. Bement, Vice-President and General Manager

Novo Engine Company
200 Porter Street, Lansing, Michigan
Please send me the new folder on Novo Roller Ring Pumps.

Name .....

Address .....

City ..... State .....

NOVO
ROLLER RING PUMP

What More can one Ask ?

LOOK at these actual working illustrations of the Moore Speedshovel owned by A. Guthrie & Company, St. Paul, Minnesota, working in stone at Dover, New Jersey. Seven tons is the weight of the stone shown in the picture to the right.

Surely a shovel that has the ability to work here is well designed and sturdily constructed. The Moore Speedshovel "Made in Manitowoc", can safely handle heavy materials due to its low center of gravity. It's easy for the operator too because he "gets the feel" with the foot accelerator, long used on this equipment.

You will find the new catalog interesting—write for a copy today.

MANITOWOC ENGINEERING WORKS, *Manitowoc, Wis.*

(Sole Licensee to manufacture and sell Moore Speedcranes, Shovels, Draglines and Trenchoes)

SPEEDCRANE

MOORE ◆ MANITOWOC

SHOVEL ~ CRANE ~ TRENCHOE ~ DRAGLINE

A NEW NAME

for a familiar HAZARD Rope

This is an actual photograph of a piece of Lay-Set Preformed Wire Rope. Note that the end is not seized. Ordinary wire rope, when cut, unravels; the strands and wires straighten out as the confined internal stress is liberated.

LAY-SET

PRE-FORMED WIRE ROPE

HAZARD announces a significant new name in wire rope —"Lay-Set"— (formerly Flex-Set).

This new name more readily associates this familiar rope with its preformed construction—for preforming "sets" each wire and strand to the exact shape it assumes in the finished rope.

Rope users everywhere are turning to preformed rope because preforming entirely eliminates the internal stresses inherent in ordinary wire rope, thereby removing the cause of most early rope failures.

Everything that the name HAZARD has meant to wire rope users for over eighty years—advanced design, first quality materials and craftsmanship, and long dependable service — is exemplified in this familiar rope with the new name, "LAY-SET", preformed by Hazard.

"LAY-SET" Preformed Wire Rope is carried in stock by the branches and dealers listed. Specify it for your next rope requirement.

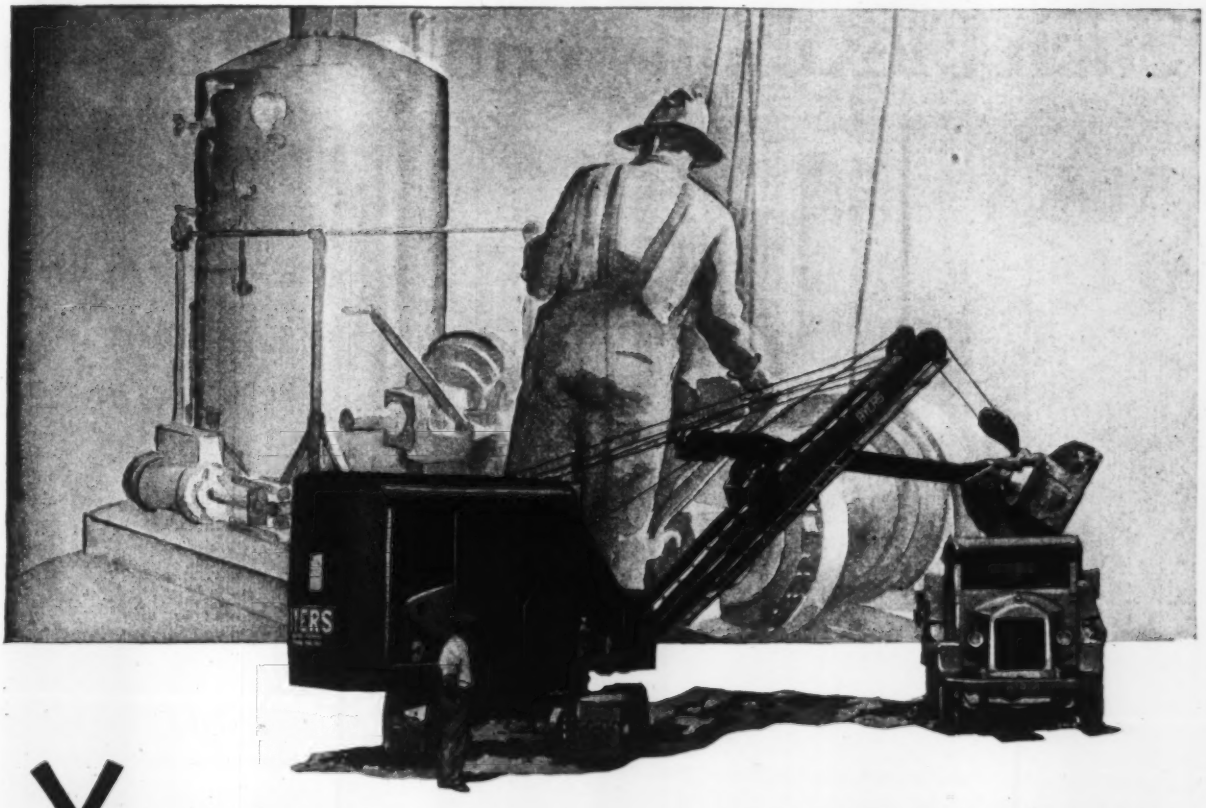
Outstanding Advantages of LAY-SET

1. No internal stresses.
2. Handles readily. Not "cranky".
3. Installed in less time.
4. Equal load on all strands.
5. Less wear on drums and sheaves.
6. LONGER LIFE.

HAZARD WIRE ROPE COMPANY

WILKES-BARRE PENNSYLVANIA

New York Chicago Pittsburgh Philadelphia San Francisco Denver Los Angeles Birmingham



YESTERDAY *and* TODAY

WHEN our fathers were "young fellers" old John Byers was making steam hoists. They were good hoists—honestly built, serviceable, and they earned their way on contractors' jobs. That was "way back when . . . ." but the influence of those steam hoists, "honestly built," still characterizes every Byers product from then to now.

Choose any model of Byers improved shovels and cranes which you need on your job and you, too, will soon find that it is honestly built, and furthermore you will find that advanced engineering, simplified design and quality construction characterize this complete 1930 Byers full revolving line.

In fact, Byers designers have so thoroughly ironed out the weaknesses of gas shovel construction that a new decade for excavating and material handling equipment is starting *now*.

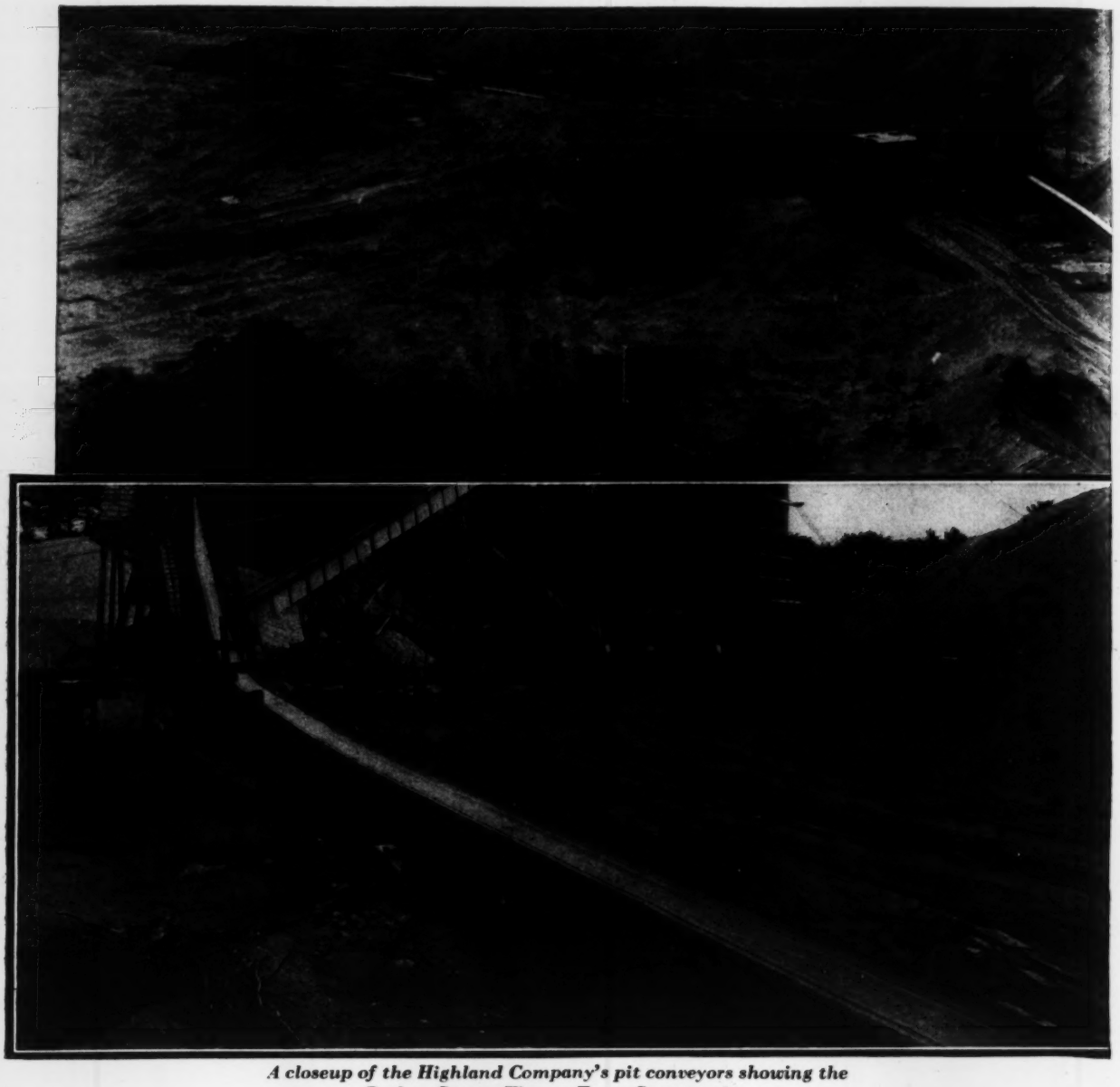
You will receive in Byers not yesterday's shovel design with occasional new developments "tacked on" but a modern shovel design with all the important developments designed *into* it. The difference will show first when you put the Byers to work, and then on your profit sheet.

Send for the new catalog or phone our distributor. The Byers Machine Company, Ravenna, Ohio. Sales and service throughout the country.

BYERS

Shovels and Cranes

Such Flexibility Can Only Lower



A closeup of the Highland Company's pit conveyors showing the Barber-Greene Warren Truss Construction

These two pictures show a typical Barber-Greene Permanent Belt Conveyor installation to provide a very economical long travel between pit and plant.

Barber-Greenes because of their unique construction can reach any part of a pit like this, quickly and easily.

Both Barber-Greene Portables and Permanents are built up of sturdy, light-weight, 3-foot Warren Truss frame sections. These sections can be changed—subtracted from—added to as occasion demands. Such changing can be done as easily and quickly in the field as it can in the shop.

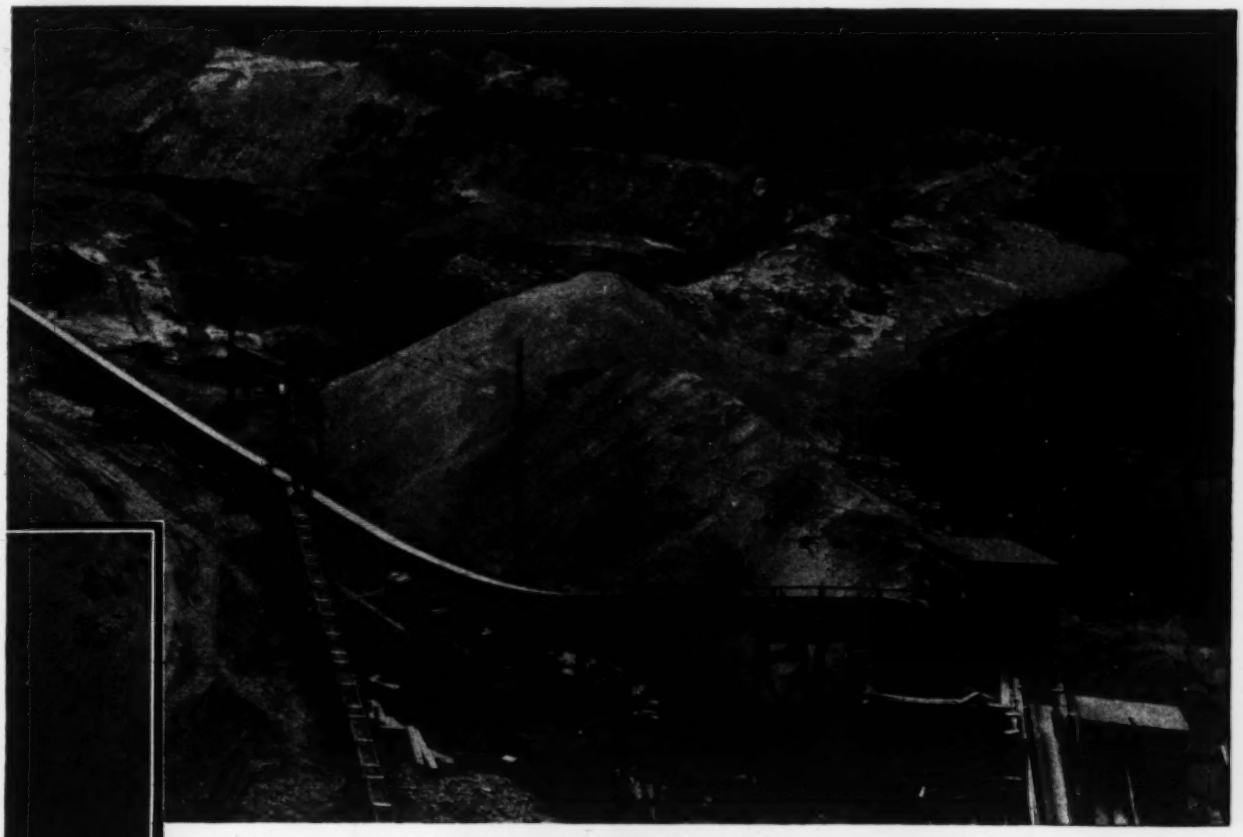
And you will always have a sturdy, light-weight conveyor that writes off its own investment cost through years of trouble-free service.

In a pit like this, the shovel or dragline can work along the conveyor right of way, dumping its loads into a portable hopper which feeds the belt. When one cut is finished it is a relatively easy matter to pull the Barber-Greenes over to the

BARBER-

422 West Park Avenue

Gravel and Sand Travel Costs



Barber-Greene permanents in the plant of the Highland Sand Gravel Company, Boston, Massachusetts

new face—as complete unit or in sections which can be easily refastened together.

Just a hint to those gravel companies who load trucks from storage piles—there are three sizes of Barber-Greene Bucket Loaders to help you lower costs on these jobs

GREENE

Aurora, Illinois

Thus with Barber-Greenes you get all the inherent low-cost travel of a swiftly moving belt which carries the material in a steady stream to washers and screens.

And you get a flexibility that cuts your costs of reaching a new pocket of gravel—or of extending the pit—to a bare minimum.

You can look into such conveyors from the point of view of your own problems by merely filling in and mailing this Request Blank. It will bring you our latest permanent conveyor book—detailing what Barber-Greene construction is and what it does.

BARBER-GREENE COMPANY,
422 West Park Avenue, Aurora, Illinois

Filling in and sending this blank will bring you complete information on Barber-Greene equipment checked:

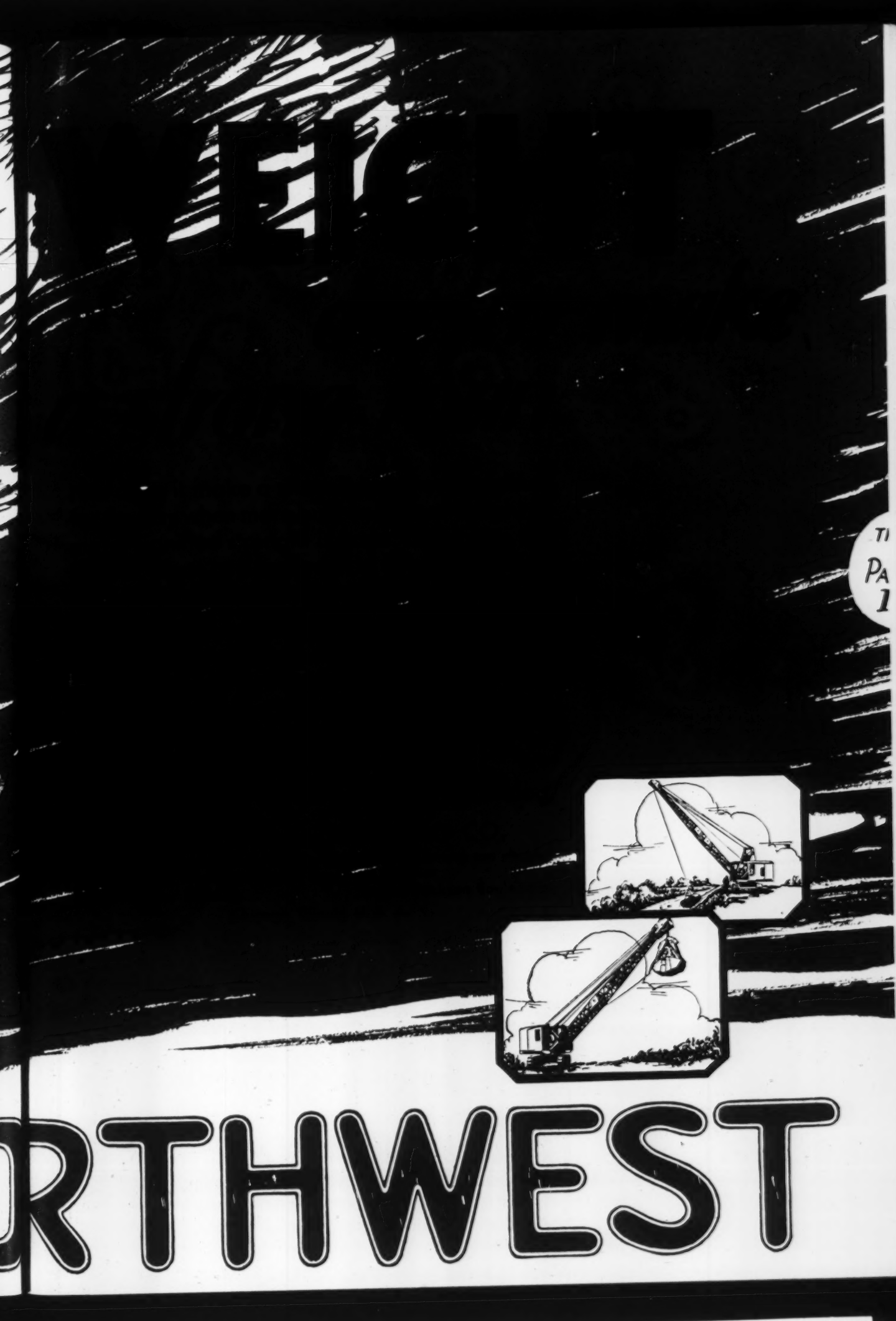
- ☐ permanent belt conveyors
- ☐ portable belt conveyors
- ☐ bucket loaders
- ☐ bucket loaders with high-frequency Leahy Screen

Name.....

Address.....

City.....State.....

ENR6-26Gray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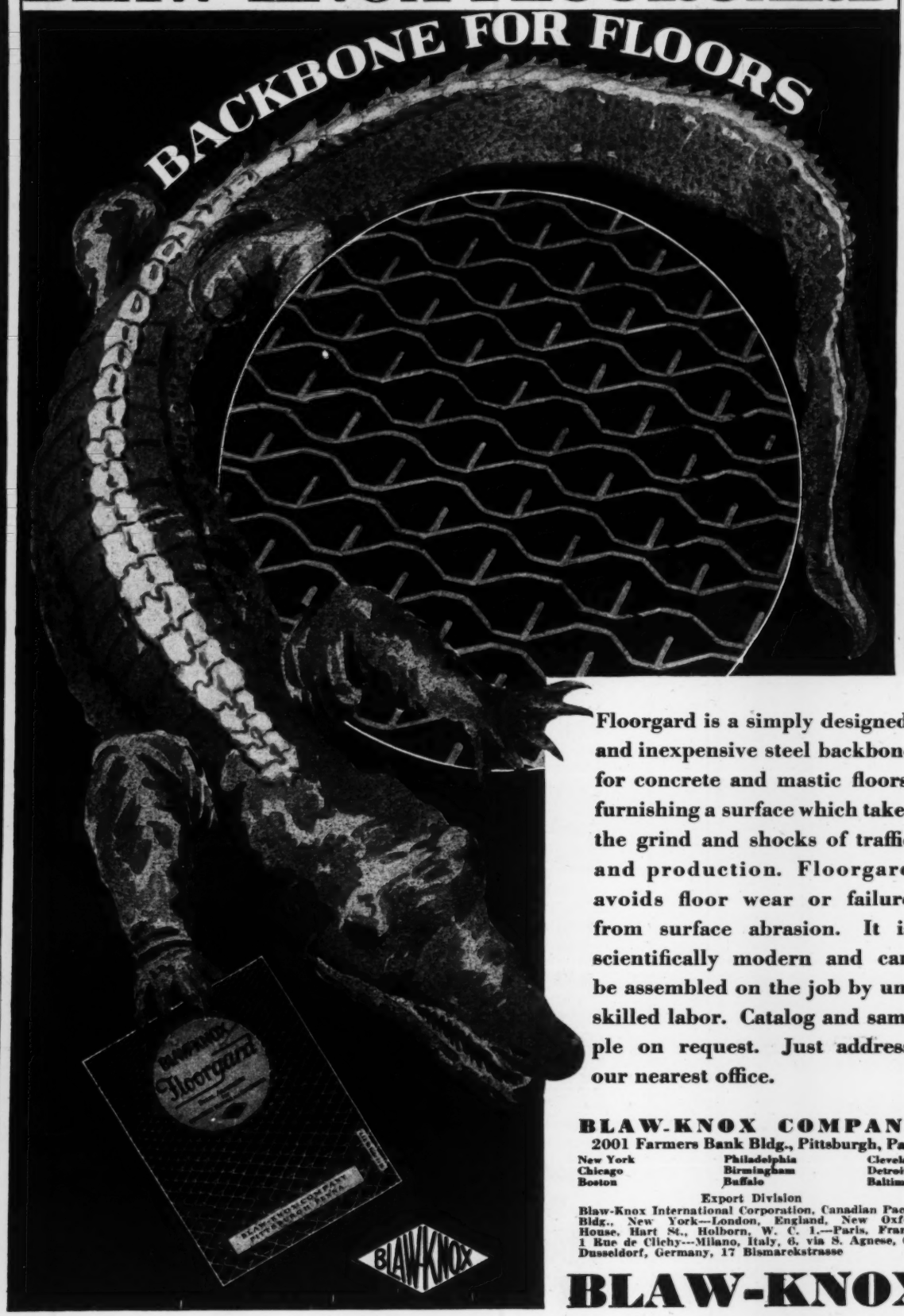
RTHWEST

BLAW-KNOX FLOORGARD



Floorgard is a simply designed, and inexpensive steel backbone for concrete and mastic floors, furnishing a surface which takes the grind and shocks of traffic and production. Floorgard avoids floor wear or failure from surface abrasion. It is scientifically modern and can be assembled on the job by unskilled labor. Catalog and sample on request. Just address our nearest office.

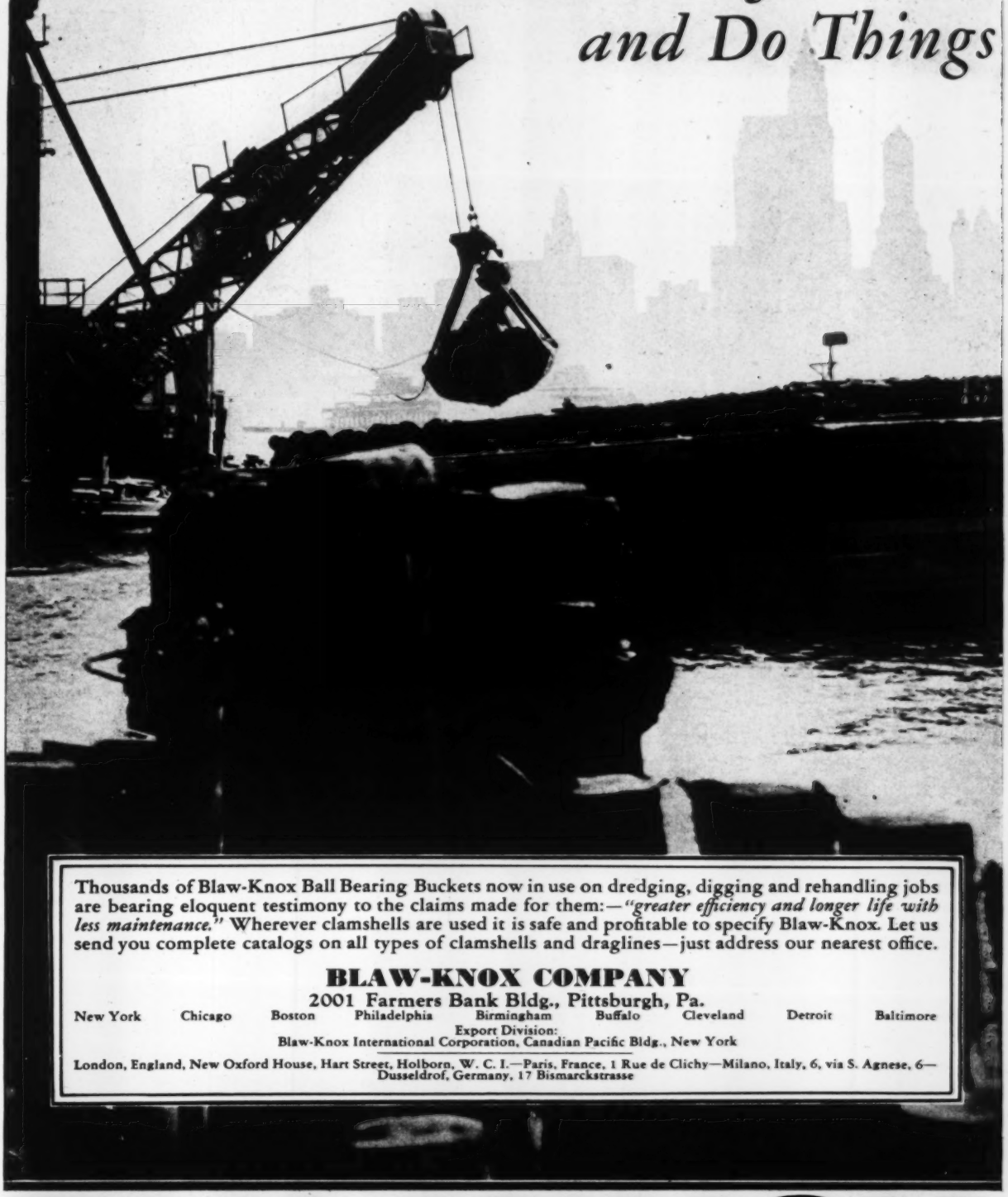
BLAW-KNOX COMPANY
2001 Farmers Bank Bldg., Pittsburgh, Pa.

New York	Philadelphia	Cleveland
Chicago	Birmingham	Detroit
Boston	Buffalo	Baltimore

Export Division
Blaw-Knox International Corporation, Canadian Pacific Bldg., New York—London, England, New Oxford House, Hart St., Holborn, W. C. 1.—Paris, France, 1 Rue de Clichy—Milano, Italy, 6, via S. Agnese, 6—Dusseldorf, Germany, 17 Bismarckstrasse

BLAW-KNOX

BLAW-KNOX BUCKETS *Go Places and Do Things*



Thousands of Blaw-Knox Ball Bearing Buckets now in use on dredging, digging and rehandling jobs are bearing eloquent testimony to the claims made for them:—*"greater efficiency and longer life with less maintenance."* Wherever clamshells are used it is safe and profitable to specify Blaw-Knox. Let us send you complete catalogs on all types of clamshells and draglines—just address our nearest office.

BLAW-KNOX COMPANY
2001 Farmers Bank Bldg., Pittsburgh, Pa.

New York Chicago Boston Philadelphia Birmingham Buffalo Cleveland Detroit Baltimore

Export Division:
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BLAW-KNOX

It is with Great Pleasure that We Announce the Purchase of the

COCHISE
ROCK DRILL MFG. CO.
LOS ANGELES, CALIFORNIA

The Manufacturers of the Famous COCHISE Rock Drills

This linking together of two great names in the Pneumatic Tool industry — THOR and COCHISE — is in direct line with the policy of the Independent Pneumatic Tool Co., which is to provide users with the highest quality tools.

Cochise Rock Drills have established an enviable reputation in the mining and construction fields of the West. They have repeatedly won highest honors in the Drilling Contests which are held in the West every few years, in proving to be the fastest cutting, most efficient and economical rock drills.

THOR Pneumatic and Electric Tools are considered the standard in all lines of industry where production methods are essential. Their design and construction have withstood the test of time and the number of prominent firms that have standardized on THOR Tools is a wonderful tribute to their supremacy.

The Cochise Rock Drill Mfg. Co. will operate as a unit of the Independent Pneumatic Tool Co. There will be no change in personnel or methods. It is our desire to extend the field of service for Cochise Rock Drills to all parts of the country so that all industries will be able to take advantage of the speed, power and economy of Cochise Drills.

We welcome this opportunity to serve a greater clientele in the mining and construction fields and pledge ourselves to the task of upholding the high reputation that Cochise Rock Drills have established.

INDEPENDENT PNEUMATIC TOOL CO.
NEW YORK 600 West Jackson Boulevard LONDON
CHICAGO, ILL.

PNEUMATIC TOOLS ··· ELECTRIC Thor TOOLS ··· AIR COMPRESSORS

Providing for years of service

To eliminate entirely all weaving and vibration, to insure perfect alignment of all bearings, and to give you the assurance of many years of uninterrupted service, the LIMA "101" rotating frame casting upon which the main machinery is mounted is cast in one solid piece. Not a bolt, rivet or section of structural steel is used in the entire frame. The supports on which rest the Timken equipped shafts and drums are only 19½ inches high, thus bringing all shafts of the main operating machinery only 24 inches above the floor level—an exclusive and desirable feature of low center of gravity and stability. *Write today for Bulletin 301.*

The Ohio Power Shovel Co.

Division Lima Locomotive Works Incorporated

Western Office 846 Straus Bldg. Chicago — Lima, Ohio — Eastern Office 2351 Graybar Bldg. New York

310

LIMA "101"

KOEHRING Shovel

All the Power Where You Want It— in the Crowd or in the Hoist

THE Koehring dipper never dodges its job. *You* put it where *you* want it! That's Koehring independent crowd and hoist, and it's a money-maker on every kind of shovel job!

Raise or lower boom from the cab without need for adjusting crowding cables! Ready instantly for high bank work, deep, close-in digging or thin stripping! No interfering bail in handling rock or timbers.

Short boom, with long sticks, and dipper that crowds above and beyond end of boom! — needs less headroom, but has long reach! Know the Koehring!

N. E. C. PRODUCTS — KOEHRING — Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors. INSLEY — Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks. T. L. SMITH— Tilting and Non-tilting Mixers, Pavers, Weigh-Mix. PARSONS — Trench Excavators, Backfillers. C. H. & E. — Portable Saw Rigs, Pumps, Hoists, Material Elevators. KWIK-MIX — Mixers: Concrete, Plaster and Mortar.

KOEHRING DUMPTOR

A THREE-IN-ONE truck, tractor and bulldozer, 5 cu. yd. struck measure capacity! Low enough for mechanical loading!

No turning after dumping! Load ahead of driver; he sees where to dump. Backs out!

Two motors, one for each multi-plane. Simple throttle steering. 1, 2, 3¾, 5 miles per hour.

Write for Dumptor literature.

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

A 5912-I

C.H.&E.

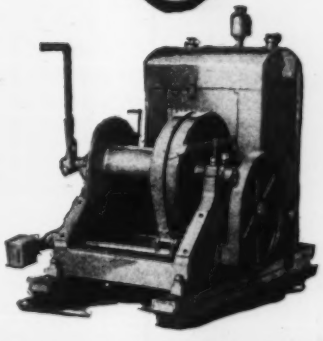
Mortar Mixer

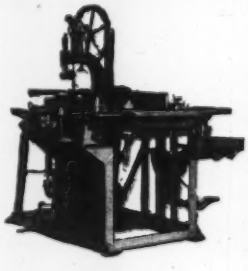
A fast, long-service mixer, built up to N. E. C. standards. Paddle shaft protected at each end with stuffing box and grease cup to protect bearings. Mixing paddle shaft driven by clutch and gear reduction. Completely enclosed engine.

No. 19 Hoist

A compact, husky hoist for light service. Frame is one single casting, insuring perfect alignment of gears which are stub tooth and machine cut. Large diameter clutch, extra wide-faced and with improved screw thrust. Hand operated accelerator, permitting idling between loads and instant pick-up under load!

Ask for Catalog.



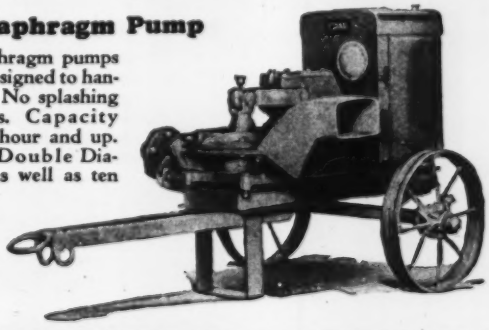


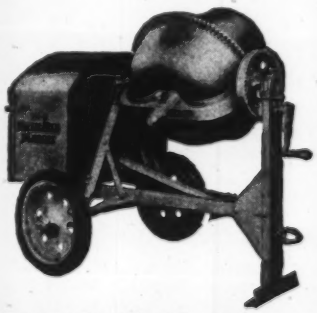
Home Builders' Saw Rig

As illustrated, with rip and band saw, jointer and boring attachment, gasoline engine or electric motor built in and under table, Texrope endless belt drive, silent and positive. C. H. & E. line of saw rigs meets every need for large and small builders. Write for saw rig Catalog.

Mud-Hen Diaphragm Pump

The latest in diaphragm pumps for trench work, designed to handle muddy water. No splashing over working parts. Capacity 6,000 gallons per hour and up. Both Single and Double Diaphragm Pumps as well as ten sizes of Centrifugal Pumps and Triplex Pumps. Write N.E.C. for Catalog of Mud-Hen.





$189 Kwik-Mix Mascot

That's the remarkably low price on this full capacity 3½-S mixer as illustrated, with roller bearing disc wheels and cushion rubber tires, F. O. B. Port Washington, Wisconsin. $168 with steel wheels and 2 H. P. engine. Kwik-Mix Mascot charges and discharges on either side. Low drum for easy shoveling. Big drum opening and short quick tilt for fast discharging. Write for Kwik-Mix Mascot Catalog.

Not a better known quality name exists in this line of equipment than C. H. & E. — now part of the greater name and greater organization of National Equipment Corporation which re-emphasizes high quality standards and the increased responsibility for national and local service behind all N.E.C. products.

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

A 5951-I

T. L. SMITH

N. E. C. LINES

KOEHRING — Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.
INSLEY — Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks.
T. L. SMITH — Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.
PARSONS — Trench Excavators, Backfillers.
C. H. & E. — Portable Saw Rigs, Pumps, Hoists, Material Elevators.
KWIK-MIX—Mixers: Concrete, Plaster and Mortar.

For Central Mixing Plants

SAVES plant construction, equipment and operating cost because low bin height cuts "lift" of materials!

The Smith Weigh-Mix does not exceed height of standard mixer!

Weighs stone, sand, cement and water, making possible standardized quality concrete!

One man easily controls all operations!

Vibrating hopper cleaner accelerates fast charging and cleans hopper to bring scales to balance! Smith high speed tilting drum discharge!

Frame easily taken down or assembled!

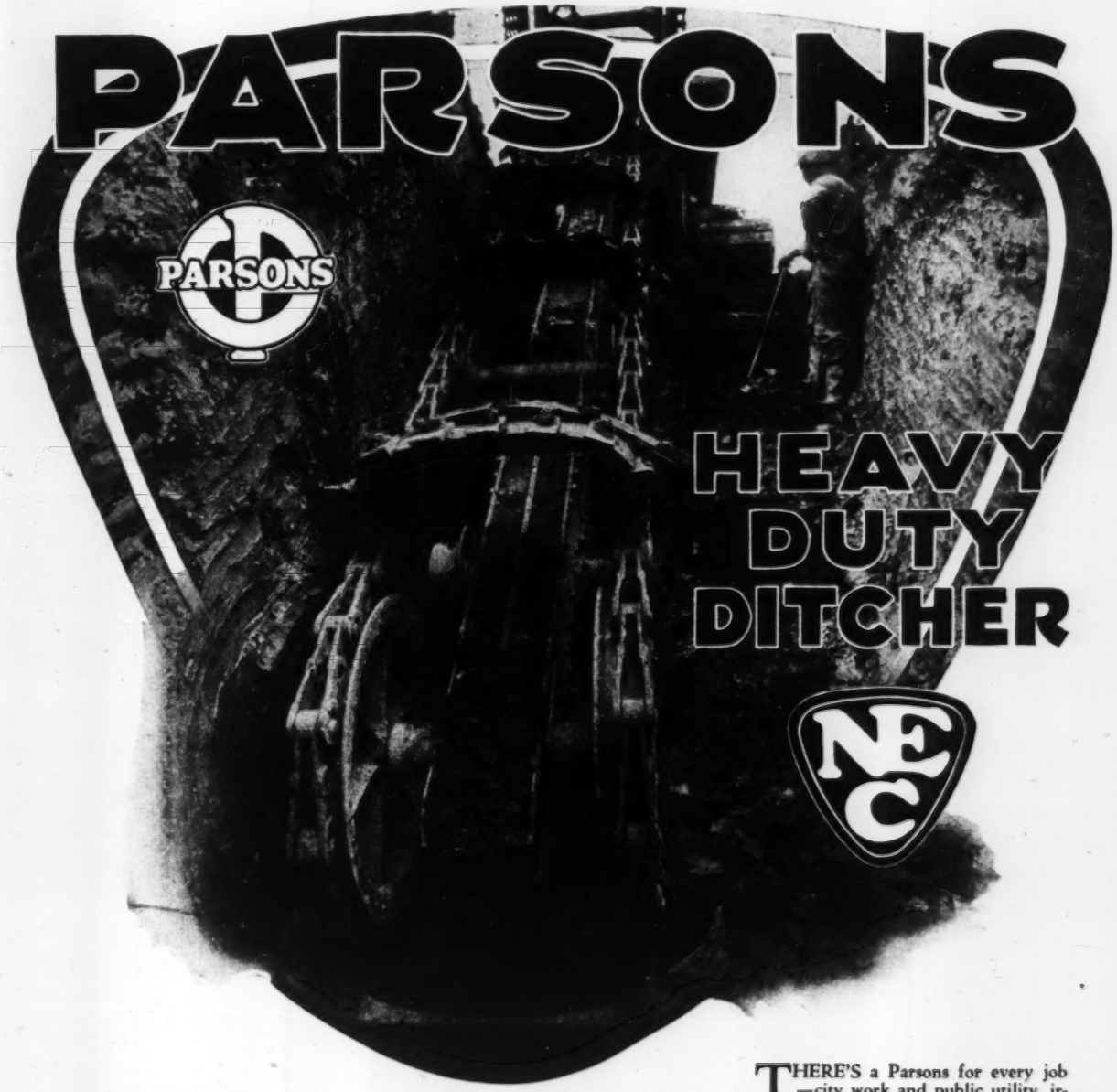
Smith Weigh-Mix for Central Mixing Plants 1, 1½, 2 and 3 yard capacities! Write for Smith Weigh-Mix Literature!

N. E. C. Service everywhere!

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

A 5698-I



EVERY Parsons size for every class of work is *Heavy Duty* — has the power and construction to do its job! *Outstandingly so!*

It is the adaptable ditcher with the range of digging, traction and conveyor speeds to meet every ground condition—with the offset boom that digs in center or towards either side of the machine and within inches of curbs or poles, and with a conveyor that spills on either side!

THERE'S a Parsons for every job —city work and public utility, irrigation, long distance pipe lining — and every one is Heavy Duty! *Write N. E. C.*

N. E. C. PRODUCTS

KOEHRING — Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors. INSLEY — Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks. T. L. SMITH — Tilting and Non-tilting Mixers, Pavers, Weigh-Mix. PARSONS — Trench Excavators, Backfillers. C. H. & E. — Portable Saw Rigs, Pumps, Hoists, Material Elevators. KWIK-MIX — Mixers: Concrete, Plaster and Mortar.

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

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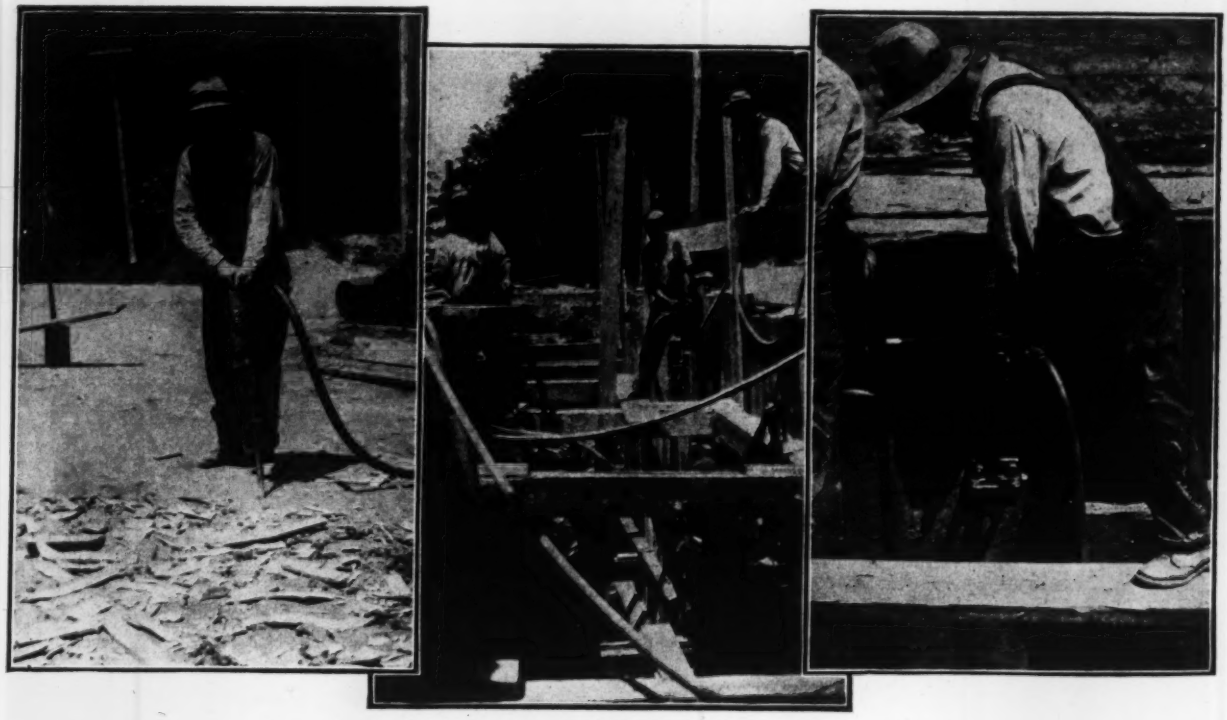


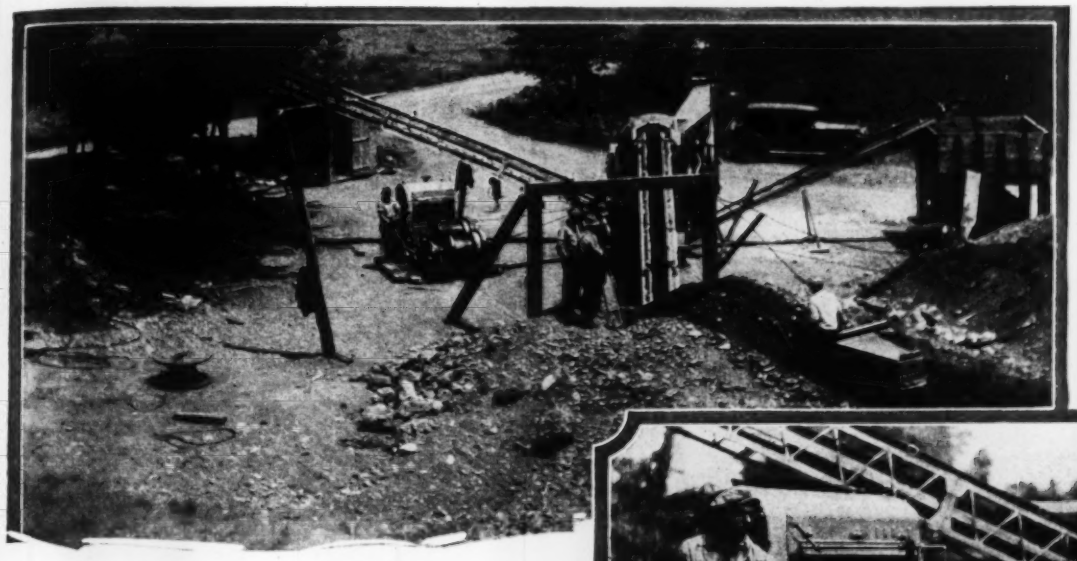
Seems no limit to what our "little fellers" will do—

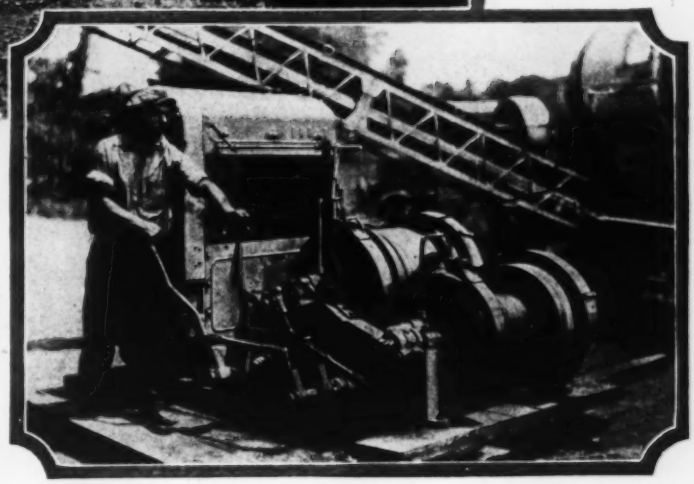
YOU men who figure on *hand labor* to do certain work—take a lesson from these photos, they show what the SMALLER McKiernan-Terry Hammers will do and do at low cost—breaking up pavements, driving light sheeting. Even digging (with spade attachment) is not beyond their scope. In other words, you'll find many times that you can cut the cost per yard or per ton of earth, all depending on what your job is—by substituting these *small* hammers for high priced hand labor. Why use good men to do what a little McKiernan-Terry can do more effectively and rapidly? Get the hammers busy—and put the men at work following them up—you'll find it pays.
Send for descriptive catalog.

McKiernan-Terry Corporation
13 Park Row, New York
Distributors in principal cities

McKIERNAN-TERRY CORPORATION
STEELE & CONDICT DIVISION
BRIDGE OPERATING MACHINERY SINCE 1863

McKIERNAN DOUBLE-ACTING





National Hoists

make large profits for this company

SEVERAL National Drag Scraper Hoists are owned and operated by the Uhl Bros. Construction Company, in and around Millersburg, Ohio. These high-speed gasoline hoists are used to operate ½-yd. drag scrapers in sand and gravel pits and are making money for this company. This company has several similar plants equipped and supplied by the Iowa Manufacturing Company. The National Hoists used are 35-hp. double drum machines with heavy-duty gasoline engines.

A large number of these National Drag Scraper Hoists, as well as the National Slack line Excavator Hoists, are being used in all parts of this country and abroad for sand and gravel operations.

If you are contemplating increasing the production in your present plant, or if you plan to open a new sand and gravel pit, do not fail to investigate the National Hoists for this work—it will pay you. Write for an estimate.

National Hoisting Engine Division
McKiernan-Terry Corporation
13 Park Row, New York
Distributors in Principal Cities

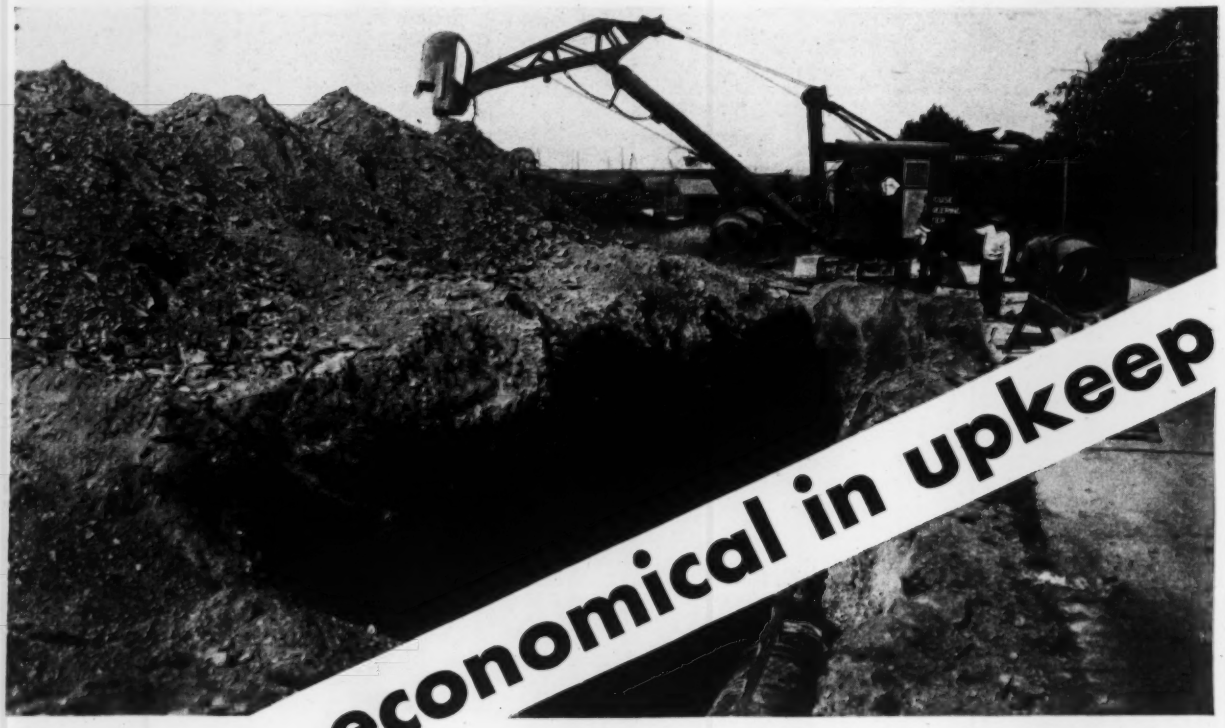
GASOLINE, ELECTRIC & STEAM HOISTS

McKIERNAN-TERRY NATIONAL HOIST DIVISION CORPORATION

SMALL CABLEWAYS
CAR MOVERS
MINE HOISTS

FOR SUCCESSFUL PERFORMANCE A.G.C.-A.

—TERRY
PILE HAMMERS



Type F Browning Crawler Trench Hoe powered with Twin City Engine, owned and operated by the Division of Water of the City of Syracuse, N. Y. This hoe both digs the trench and sets the pipe.

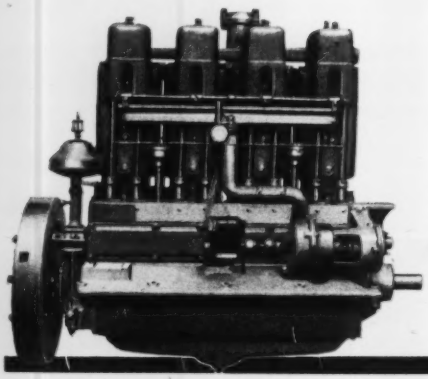
BROWNING AND TWIN CITY

40 TO 140 H.P.

THE Twin City Engine is designed to give maximum service at minimum expense for repair and operation. On the hundredth job as well as the first, a Twin City goes on working steadily, dependably, at very low upkeep cost. It saves the operator's time and spares the owner's pocketbook. Contractors find they can operate a machine powered with a Twin City Engine continuously on the toughest kind of jobs without the annoyance and loss of time caused by frequent stops for repairs. The Twin City is a real heavy duty engine. It is built for heavy duty and backed by twenty-six years of successful operation. This is why The Browning Crane Company and other outstanding manufacturers of power machinery use Twin City Engines in their equipment.

Twin City Engines are manufactured by the Minneapolis-Moline Power Implement Company, Minneapolis, Minnesota, and are furnished in equipment made by the following manufacturers:

Northwest Engineering Company
The Browning Crane Company
The Parsons Company
Austin Machinery Corp.
Buckeye Traction Ditcher Company
Sargent Machinery Company
Cement Gun Contracting Company
Star Drilling Machine Company
W. G. Humphrey Dredge Company



TWIN CITY ENGINES

BUCKEYES ARE INVESTMENTS IN EARNING POWER!

Clamshell

3/8-Yard *Utility* Backfiller-Crane

Buyers of the Utility Buckeye are investing in its earning power, in its consistent daily all-around service. Within the range of its ⅜-yard capacity, this small, compact, versatile machine acknowledges no competition. Quickly convertible to Clamshell, Crane, Dragline, Orange-peel and Backfiller service, it will more than pay its way—*every day*—on some construction job or other.

Backfiller

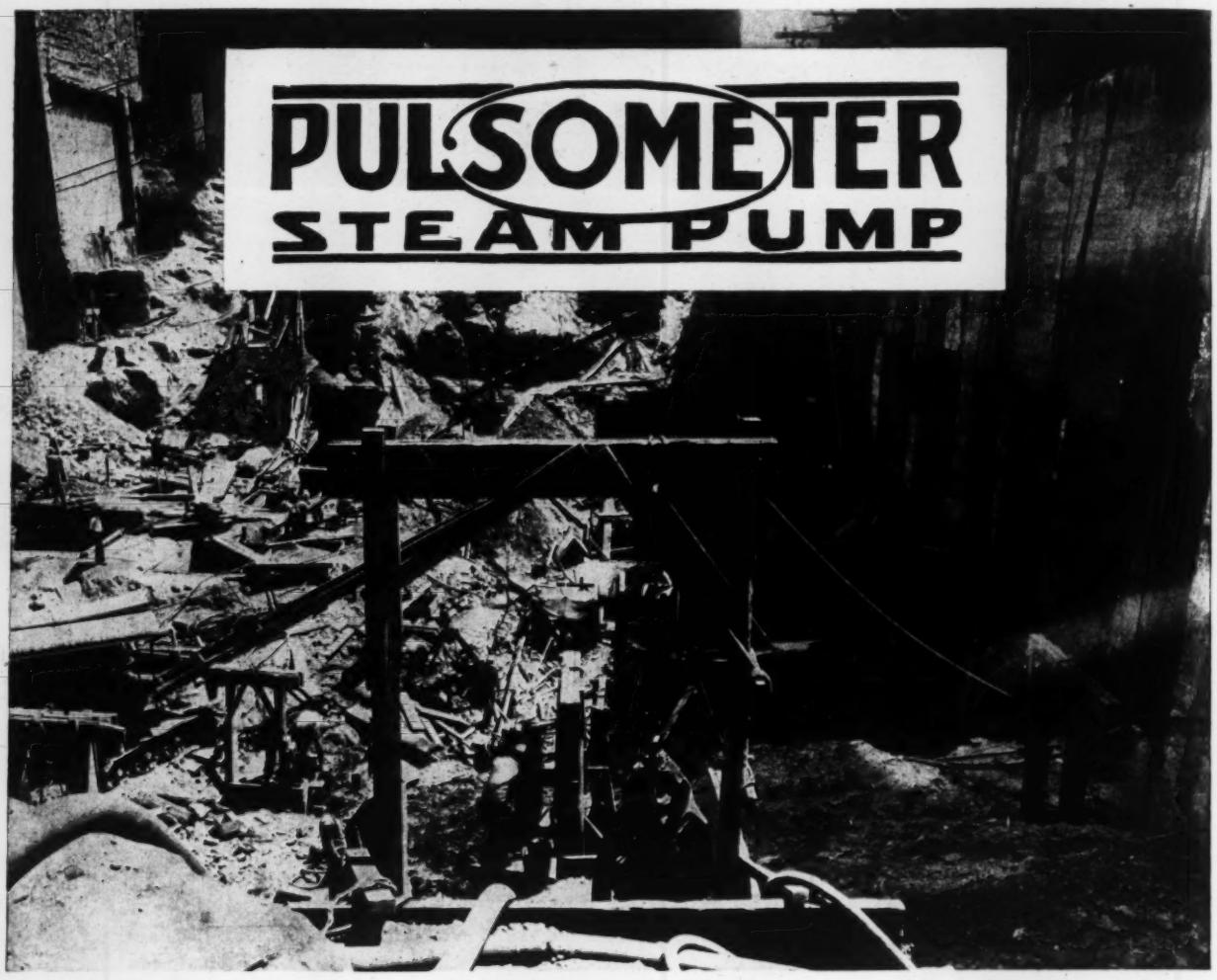
Distinguishing mechanical features include—Two speeds for all operations, including traction; Twin Disc clutch controls; machine-cut gears from solid blanks, heat-treated and hardened; upper and lower bases both one-piece electric steel castings; cable drums mounted on separate shafts; Timken roller bearings; adjustable-length boom; full-circle swing; and Buckeye steel-tread Alligator crawler wheels with brakes for safe operation on grades . . . Complete specifications and performance records sent on request.

Crane

THE BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio

Buckeye

THERE'S A BUCKEYE SALES AND SERVICE OFFICE NEAR YOU



In holes 50 to 80 ft. below ground level

Pulsometer Steam Pumps are on the job pumping out foundations for the Lincoln Liberty Building in Philadelphia. Note the Pulsometer in the foreground, hauled as far as possible, to make this photo by courtesy of the Pierce Steel Pile Corporation. Mr. Myer, Supt. on this job, states that he considers the Pulsometer *best* for this class of work—"they proved very successful and in every way satisfactory." And *why not*, when you consider that the Pulsometer is the only pump in existence that needs no foundation, no lubrication, and will pump *anything that flows!*

PULSOMETER STEAM PUMP CO.

Executive Offices:

225 West 42nd Street, New York, N. Y.

NOTE:

You can rent a Pulsometer and prove all we say, or buy one and pay as you pump. Send for details and catalog.

DISTRIBUTORS

110 S. Howard St.	BALTIMORE
249 Pearl St.	HARTFORD, CONN.
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West Side of 16th St. Viaduct	MILWAUKEE
530 Monroe Ave. N. W.	GRAND RAPIDS, MICH.
571 West End Ave.	CARTHAGE, N. Y.
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1056 Arlington St.	WINNIPEG, CAN.
Excelsior Life Bldg.	TORONTO, CAN.
New P. O. Box 1080	MONTREAL, CAN.

PAYING PAY LOADS

PAYING PAY LOADS

The mixer drum revolves while loading thus speeding up distribution of the load. With the assistance of the mixer blades, material is carried in rapidly and distributed evenly.

THOROUGH DRY MIXING

The mixer drum is revolved while loading. This, in combination with the scientific arrangement of blades, insures a thorough dry mixing of the aggregates before the water is admitted.

RAPID LOADING

Exceedingly rapid loading is made possible by the revolving mixer drum and the arrangement of the mixer blades.

That portion of the carrier's gross weight for which you are paid is termed the Pay Load although you may be losing money hauling it.

The best way to convert a Losing Pay Load into a Paying Pay Load is to increase the ratio of the Pay Load to the carrier.

Paris TRANSIT Mixers alone are able to mix and deliver Paying Pay Loads by reason of their exclusive structural features.

Cone elevated and drum revolving, facilitates loading. Dry Mixing and loading simultaneously induces concentration of aggregates which permits the introduction of the Paying Pay Load.

Paying Pay Loads, Rapid Loading, Mixing in Transit, Quick Controlled Discharging, assures a Profitable Business.

FOR MORE DETAILED INFORMATION: WRITE OR WIRE—

TRANSIT MIXERS, Inc.

Call Building, San Francisco

New York Chicago Vancouver, B. C.

Sika

*Pronounced SEE-KA
The Sanskrit word for "DRY"

Sika
WATERPROOFS UNCONDITIONALLY

SIKA* is used by adding it in measure proportions to the gauge water. Sika* is colored to correspond to the label, thus simplifying its use. Supplied in convenient drums and cans.

SIKA* is a liquid to be added to the gauging water, supplied in 6 graded strengths as follows:

No. 1—Yellow label, normal setting.

No. 2—Red label, instantaneous setting—15-30 seconds.

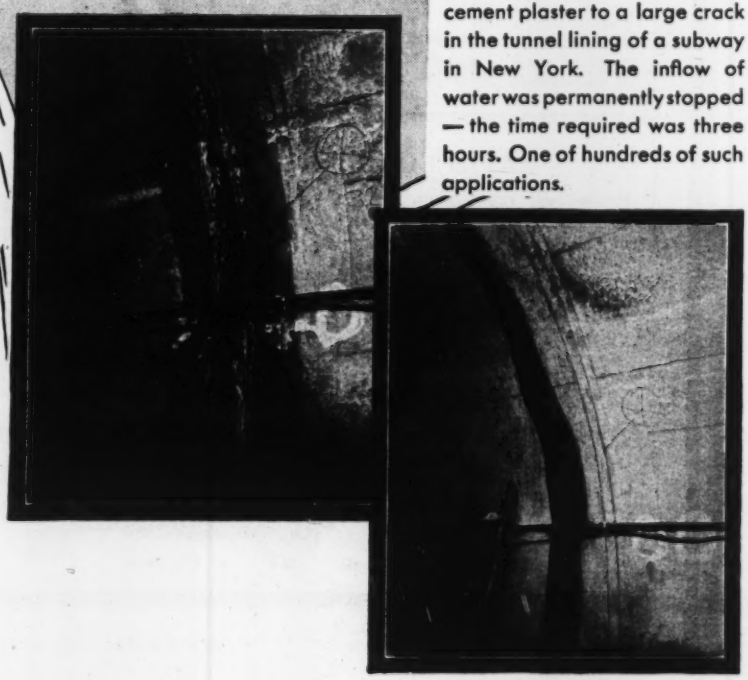
No. 3—Green label, extra rapid setting.

No. 4—Brown label, rapid setting.

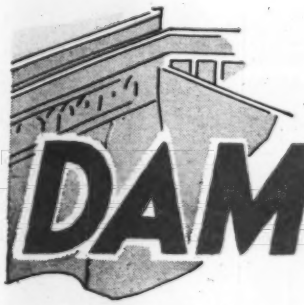
No. 4A—Gray brown label, almost instantaneous setting—30-60 seconds.

No. 5—Gray paste for waterproofing brick and stonework.

(1 gallon of Sika* waterproofs 1 cu. yard of concrete)



BEFORE and after applying a patch of Sika*-treated cement plaster to a large crack in the tunnel lining of a subway in New York. The inflow of water was permanently stopped — the time required was three hours. One of hundreds of such applications.



DAMS ANY FLOOD!

- - - Sika* stops any leak without removing the pressure

CONCRETE is made very dense and quick setting with Sika*. As part of the mix it makes new concrete permanently waterproof. Sika-* treated cement used as a skim coat or for patching, instantly and permanently stops leaks in concrete. Cracks in dams, tunnel linings, penstocks, sewers and other structures which leak water in streams can be permanently plugged WITHOUT REMOVING THE HYDRAULIC PRESSURE.

Sika* is new to America but has been used in Europe, England and Australia for 17 years. Such famous engineering projects as the London Electric Underground Railway, Paris Underground, Berlin Underground, Madrid Underground, Glasgow Underground, Geneva Underground, St. Gothard Tunnel and Simplon Tunnel are waterproofed with Sika*.

In America, Sika* has been used to re-waterproof the waterproofing work of others in the concrete walls of six sections of the new subway construction in New York City by Patrick McGovern, Incorporated; Rosoff Subway Construction Co., Marcus Contracting Co., D. C. Serber; Clemente Contracting Co.; Oakdale Contracting Co.; Interboro Rapid Transit; Board of Transportation. Sika* has also been used for waterproofing parts of the N. Y. Public Library, the Squibb Building, Fox Film Building, Mecca Temple and many others.

Sika* is a product of established merit and there is plenty of evidence of its great usefulness. *Sika* has never had a failure.* The American Sika* Corporation welcomes inquiries from engineers and will demonstrate Sika* to those who are interested. Literature will be sent on request.

The American Sika* Corporation

56 West 45th Street
New York, N. Y.

413 North State Street
Chicago, Ill.

Sika* Canada Limited
1198 University Street
Montreal, Canada

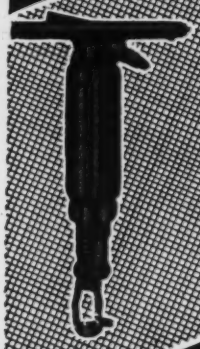
Equipment for all Needs

Portable Compressors
110-160-220-310 Cu. Ft. Capacity

Model 28A

Model 11

Model 15HS



Model 15

On all types of construction or demolition work where air powered tools are necessary, you will find that **Gardner-Denver Portable Compressors and Air Tools** stand alone where a certain amount of work must be accomplished in a given period of time. The ability to stay on the job day in and day out, gives the operator that feeling of assurance that good tools in the hands of competent operators always do.

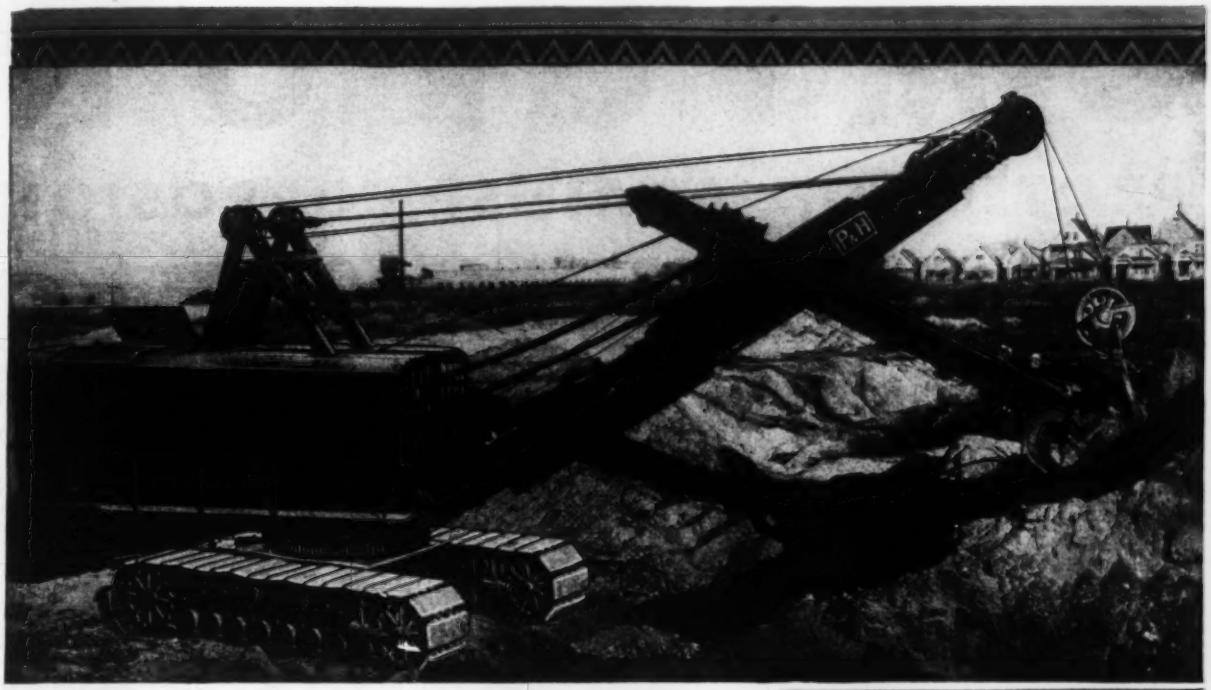
Let our representative call and convince you.

GARDNER-DENVER COMPANY

QUINCY, ILL. DENVER, COLO.

Sales Offices Throughout the World

GARDNER-DENVER



TWO BIG EXCAVATORS —FAST AND MOBILE

ANY idea that large capacity excavators must, of necessity, be slow, goes glimmering when you consider these two great P & H Machines.

Both are fast... fast of swing, fast of line speed, fast of travel and maneuver. They are of identical design and construction, the 2½-3 yd. model being but a smaller edition of the 3½-4 yd. one. Provided with steering brakes, either machine can be steered by the operator in the cab without the use of chocks.

All the vast experience of P & H in building over 3,000 excavators and in perfecting the application of Diesel power to this type of equipment, is embodied in these new machines.

There are important modern features which appeal at once to men familiar with excavating requirements... roller bearings on all main shafts above the deck... the celebrated P & H Chain crowd... maximum delivery of power to the digging end ... unit cast steel frames with engine securely mounted directly upon the revolving frame ... built heavy to stand the tremendous strain of Diesel or electric power in hard digging... quickly convertible into dragline. These are but *some* of the features.

TYPE 800 2½-3 YDS.

TYPE 900 3½-4 YDS.

Acquaint yourself with the full details of these fast, powerful, new excavators. We will gladly mail you booklets which contain complete details.

HARNISCHFEGER CORPORATION
Established in 1884
3804 National Avenue, Milwaukee, Wis.
Offices and Agents in All Principal Cities

A COMPLETE LINE OF EXCAVATORS—CAPACITIES FROM ½ TO 4 YDS.

P&H DIESEL EXCAVATORS

(A-521)

OMICRON

PROTECTION AGAINST CORROSION IN CONCRETE FLOORS

MICROSCOPIC examination shows the presence of non-cementitious crystals in concrete chemically formed during the hydration process. These solubles are the starting points for disintegration. Corrosive agents—acids or alkalis—dissolve them, leaving the floor honeycombed and multiplying the destructive effect of abrasive wear.

Microscopic photograph of cement briquet showing calcium hydroxide crystals—one of the waste soluble products attacked by corrosion.

No floor is safe from corrosion. Even the mild acidic precipitation from smoke or fumes attacks the solubles in concrete. That action is intensified in the presence of acids or alkalis in chemicals, greases, fats, oils, milk, fruit juices and many other commonly present substances.

Now corrosion can be checked. Now the useful life of concrete floors can be extended. Omicron—a vital new ingredient discovered by Master Builders Research Laboratories—makes concrete floors highly resistant to corrosive disintegration.

Omicron converts the vulnerable solubles into non-soluble, cementitious products. Materially retarding the action of corrosives, Omicron also adds greatly to the strength of concrete.

"Concrete Bearings"
A new, educational moving picture showing how BETTER concrete floors are laid. We'll gladly arrange a screening at your convenience.

Many tests made by recognized laboratories establish the value of Omicron in checking disintegration and in giving added strength. A report of the findings will be mailed upon your request.

The MASTER BUILDERS Co.

FACTORIES: CLEVELAND
BUFFALO, IRVINGTON

CLEVELAND, OHIO

SALES OFFICES AND STOCKS
IN ALL PRINCIPAL CITIES

FOR INDUSTRIAL FLOORS

METALICRON—an iron floor-finish aggregate, or metallic hardener, highly refined. Contains Omicron. Produces most wear-resisting disintegration-resisting concrete—waterproof, dustproof. For monolithic or topping finish. Also available in colors.

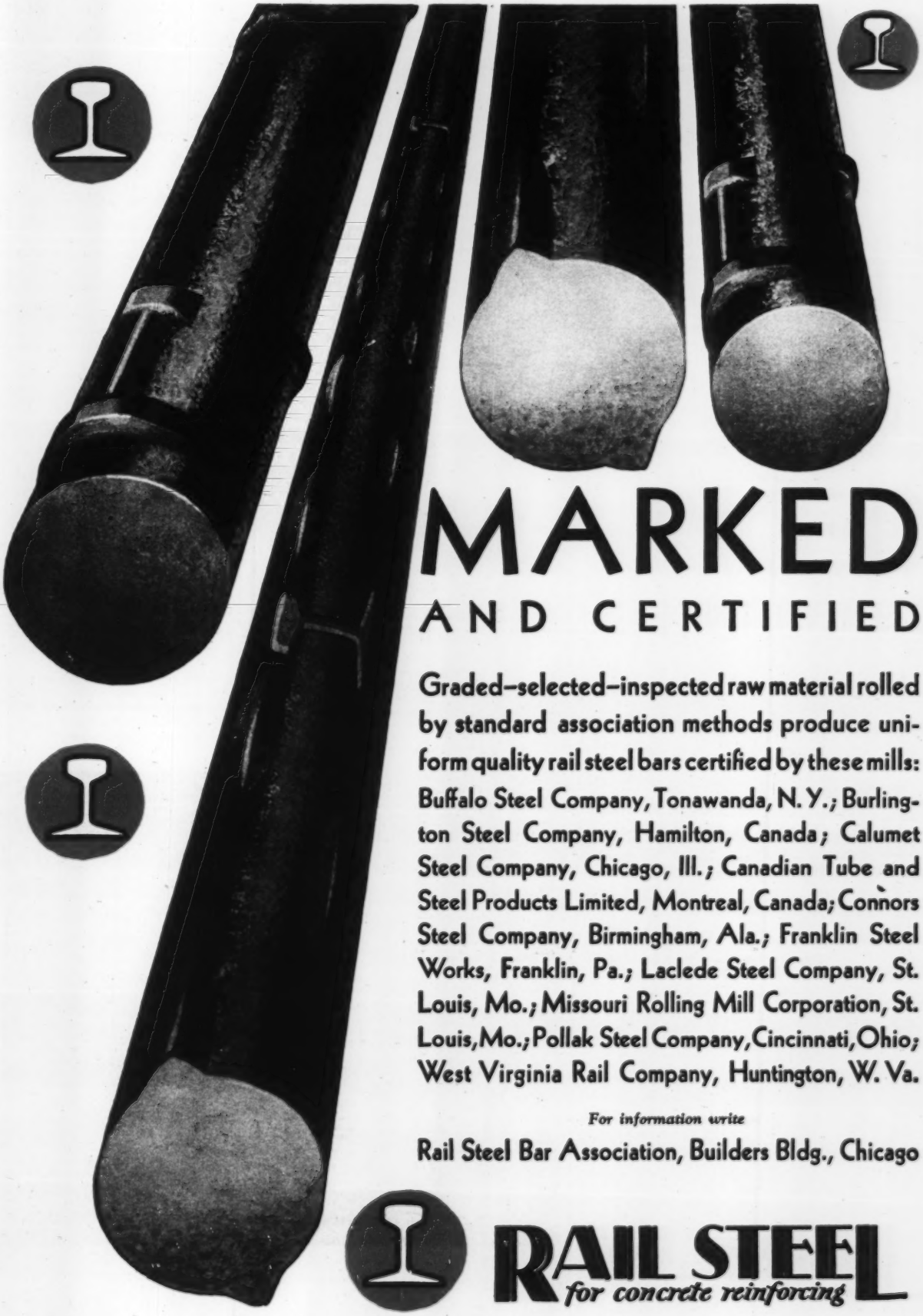
Omicron is an exclusive product of the Master Builders Company and is available as a basic ingredient in these integral concrete floor hardeners only.

FOR COMMERCIAL FLOORS

MASTERMIX—Omicron-containing liquid paste, mixed with the gauging water. Hardens, waterproofs, dustproofs the entire topping. Meets every commercial floor condition.

FOR COLORED FLOORS

COLORMIX—Omicron-containing paste, mixed with the gauging water. Stronger than plain concrete. Produces uniform, fadeproof colors throughout topping. Hardens, waterproofs, dustproofs.



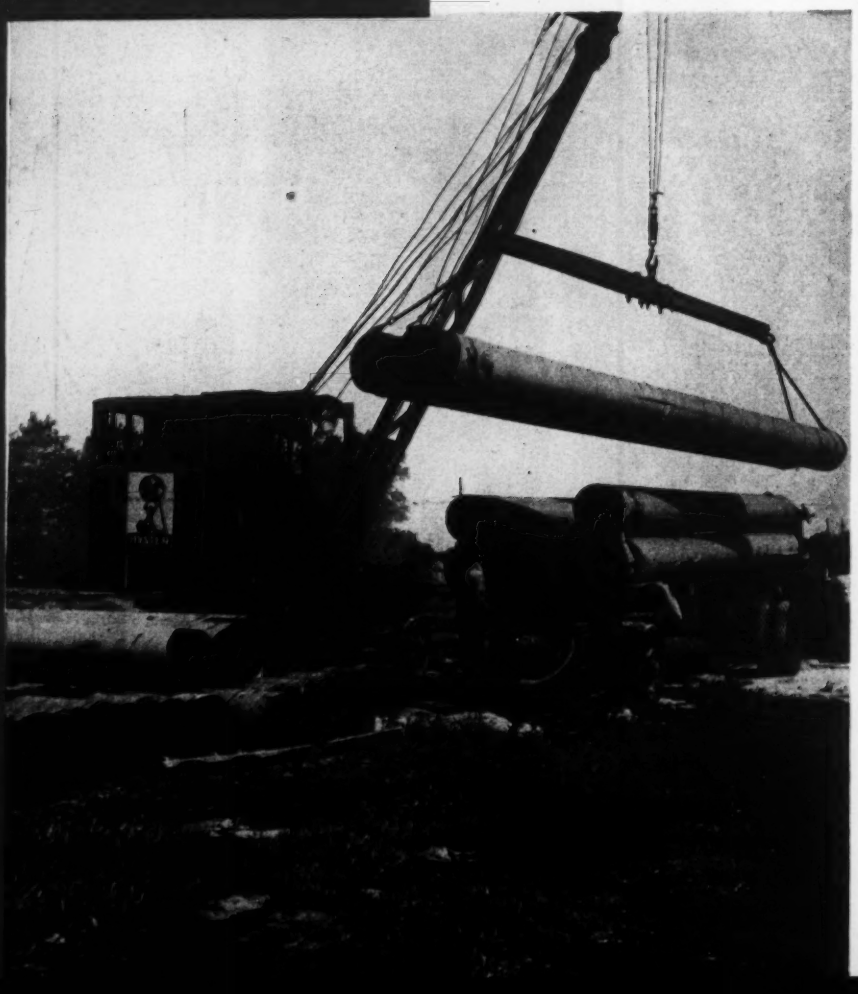
MARKED AND CERTIFIED

Graded–selected–inspected raw material rolled by standard association methods produce uniform quality rail steel bars certified by these mills: Buffalo Steel Company, Tonawanda, N. Y.; Burlington Steel Company, Hamilton, Canada; Calumet Steel Company, Chicago, Ill.; Canadian Tube and Steel Products Limited, Montreal, Canada; Connors Steel Company, Birmingham, Ala.; Franklin Steel Works, Franklin, Pa.; Laclede Steel Company, St. Louis, Mo.; Missouri Rolling Mill Corporation, St. Louis, Mo.; Pollak Steel Company, Cincinnati, Ohio; West Virginia Rail Company, Huntington, W. Va.

For information write

Rail Steel Bar Association, Builders Bldg., Chicago

RAIL STEEL
for concrete reinforcing

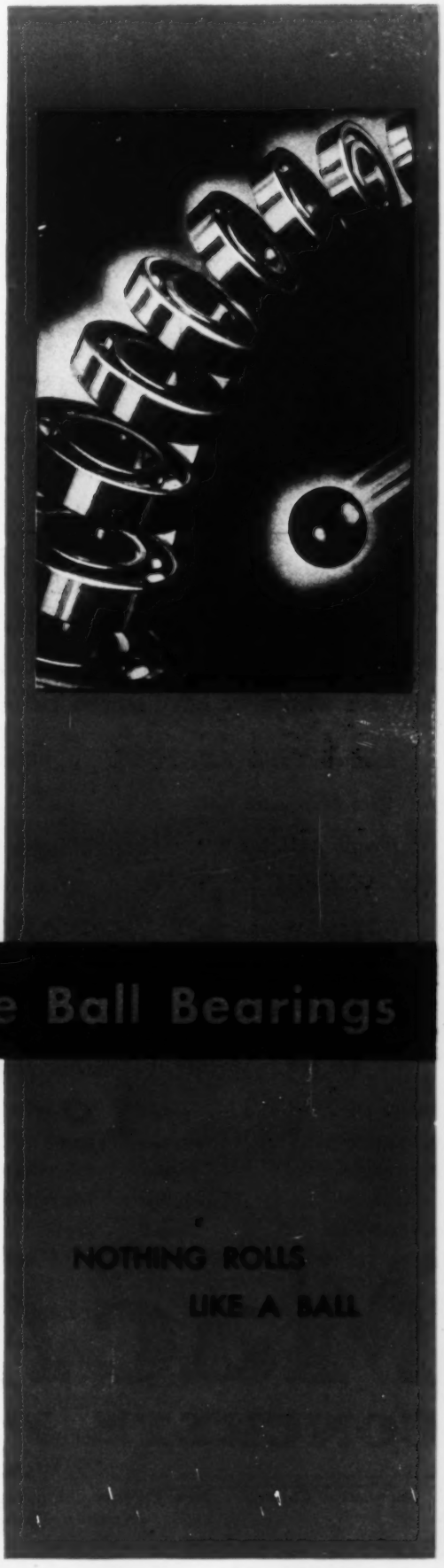


LEFT: Down in the works of this Hyster Automotive Crane are 40 New Departure Ball Bearings—in the transmission, boom hoist, main hoist, rotating mechanism, crane rotating rollers and in the sturdy engine, too.

BELOW: The hoist is one of man's oldest and most useful devices. In its complete modernization New Departure Ball Bearings increase efficiency life and economy.

The Willamette-Ersted "Hyster," too,

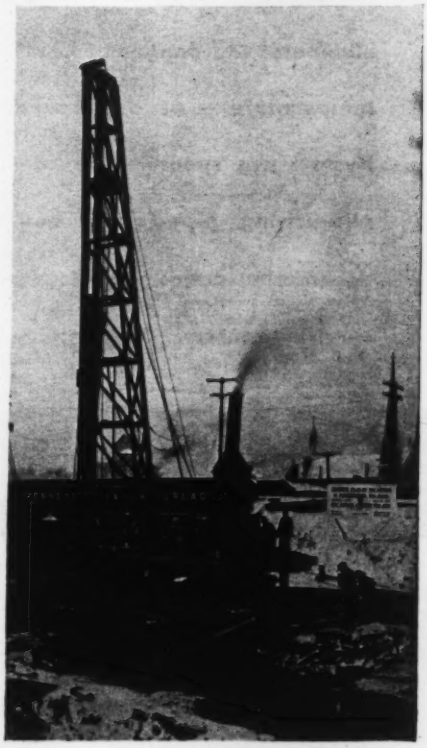
Long life and dependability guided Willamette-Ersted engineers in their choice of New Departure Ball Bearings for both their Hoist and Automotive Crane. ● A costly forging method makes New Departure races dense and tough—shock-proof. Deep grooves, high shoulders and large balls bear enormous loads from all directions. Free-rolling action saves power . . . prevents wear . . . absolutely eliminates the danger of bearing seizure at any temperature — at any speed. ● Hundreds of Hysters are speeding up construction, logging, pile-driving, pipe-laying, house-moving and a dozen other duties, in remote territories far from servicing centers. Their economical and trouble-free performance has more than justified the the slightly added expense of building with New Departures. ● New Departure advantages are equally important in the entire range of construction equipment, from shovels to trench diggers. ● The New Departure Mfg. Co., Bristol, Conn., Detroit, Chicago, San Francisco and London.



IT has been our pleasure to have been selected by important railroads throughout the United States and Canada to handle their pile work. A partial list of railroads whom we have served includes the following:

Southern Pacific R.R.	Illinois Terminal R.R.
Pere Marquette R.R.	Pennsylvania R.R.
Boston & Maine R.R.	Philadelphia & Reading R.R.
New York Connecting R.R.	Delaware & Hudson Company
Canadian Pacific R.R.	Canadian National R.R.

Oregon & Washington R.R. & Navigation Company



Check your requirements against MacArthur qualifications:

PRODUCT	*proven*	CLIENTELE	*illustrious*
EXPERIENCE	*20 years*	RESPONSIBILITY	*demonstrated*
EQUIPMENT	*latest*	ENGINEERING	*sound*
RESOURCES	*unlimited*	PERFORMANCE	*100%*
PERSONNEL	*capable*	SPEED	*record-breaking*

MacARTHUR

CONCRETE PILE CORPORATION

19 West 44th Street, New York

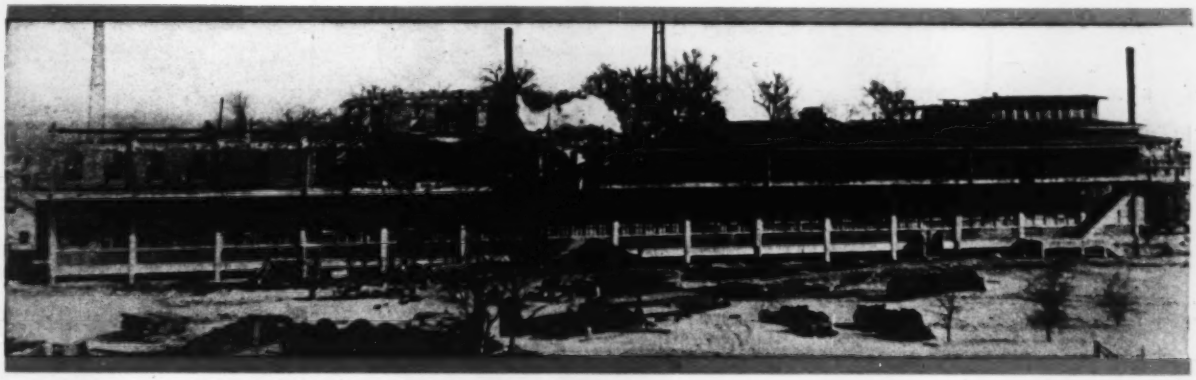
Branches: Chicago New Orleans Pittsburgh Boston Detroit Philadelphia Cleveland San Francisco

Canadian MacArthur Concrete Pile Co., Ltd., Montreal

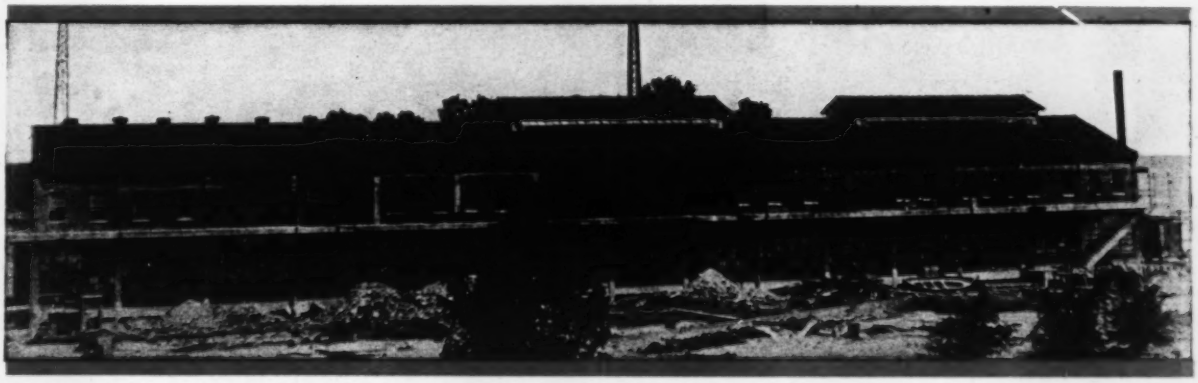
Giles Drilling Corporation (an affiliated company) will welcome the opportunity to submit estimates on core borings or soundings of any description.

FIRE DECIDED *which* ROOF WAS BEST----

but at what cost!



When roofing estimates were submitted for this warehouse erected in Memphis, Tenn., in 1921, Cementile was eliminated in favor of a wood deck roof for apparent economical reasons. Five years later fire destroyed the wood roof. Now, fireproof Cementile protects this warehouse.



Here is an old story—realization *after a fire* of the value of fire-protection. All that loss of time and money could have been prevented at the very beginning by installing a Cementile roof. For this roof insures fire-protection.

No flames, however fierce—no moisture—no natural destructive force of any kind can harm this roofing tile of steel-reinforced concrete. And the initial cost is the only price you pay for permanent Cementile protection.

Send for our illustrated roofing book which gives you new and interesting facts about this low cost, fire-proof roofing, and its many advantages.

AMERICAN CEMENT TILE MANUFACTURING COMPANY

802 OLIVER BUILDING · · · PITTSBURGH, PA.

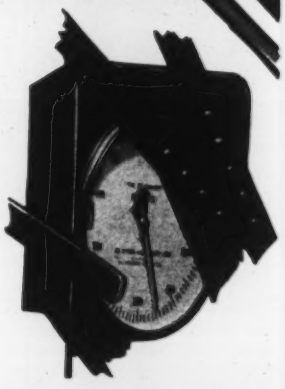
Plants: WAMPUM, PA. LINCOLN, N. J. BIRMINGHAM, ALA.

Offices: PITTSBURGH NEW YORK PHILADELPHIA ATLANTA BIRMINGHAM

CEMENTILE

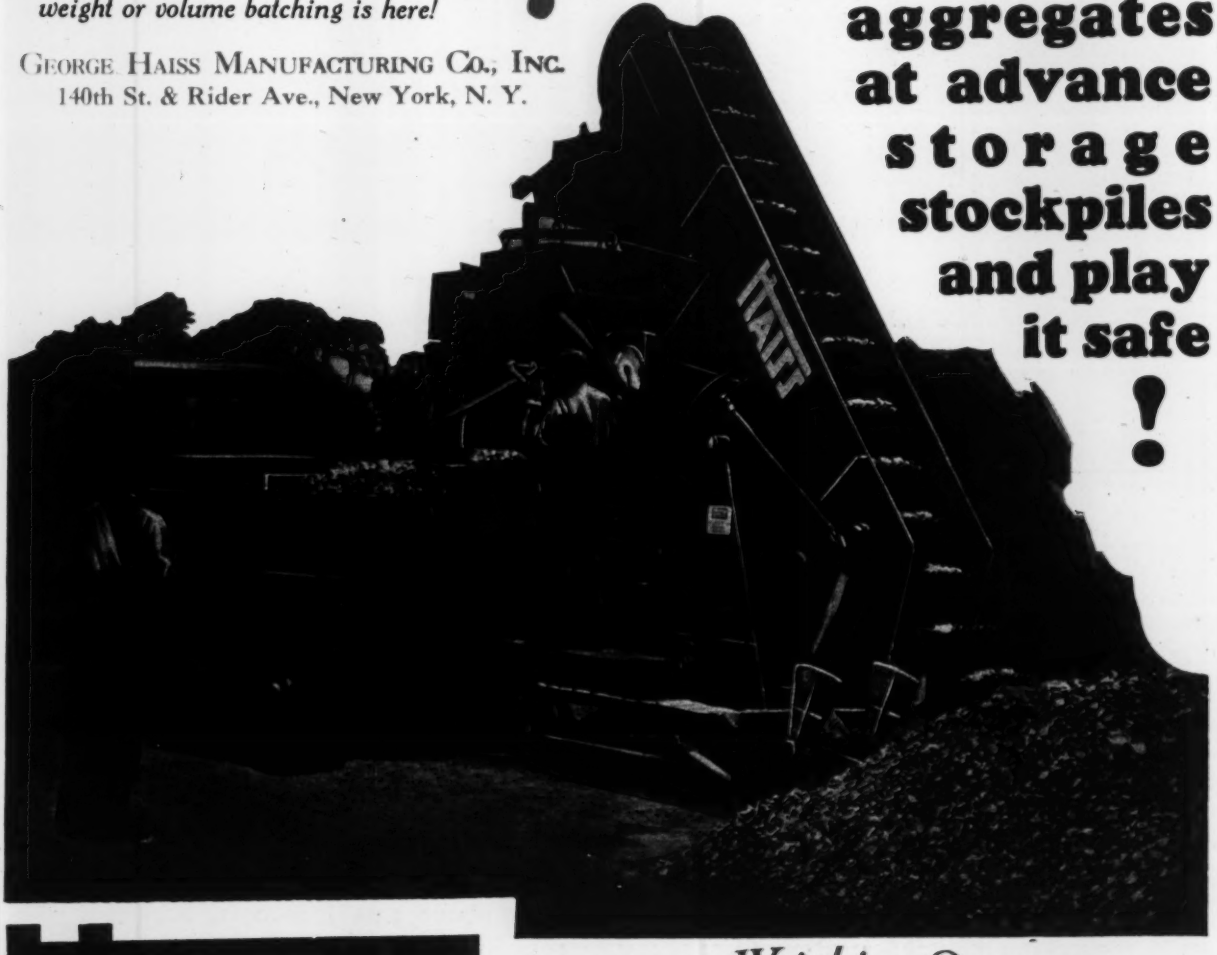
SO LONG as you allow control of a daily aggregate supply to rest with the railroad or material yard—or in the lap of gods who can decree hub-deep mud—just so long are you giving odds to fate. Last year one New York State contractor started with 75 cars stockpiled in advance, and saw railroad delays whittle that reserve down to a scant day's supply ahead. *The equipment for low cost loading and weight or volume batching is here!*

GEORGE HAISS MANUFACTURING CO., INC.
140th St. & Rider Ave., New York, N. Y.



The Haiss Weighing Hopper meets all conditions

So batch your aggregates at advance storage stockpiles and play it safe!



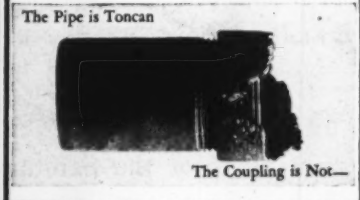
HAISS *Volume and Weighing Batch Hoppers*

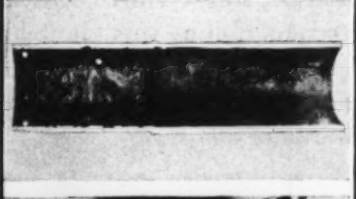
and "Path Digging" **LOADERS**

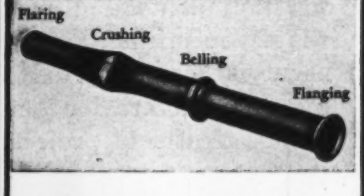
H-674

CAN ANY OTHER PIPE OFFER YOU AS MUCH?

Fe + Cu + Mo
Iron Copper Molybdenum
= TONCAN COPPER MOLYB-DEN-UM







Thirty-two pages of interesting information for the benefit of pipe users who want up-to-the-minute data. *Just ask for your* copy of

"Pipe For Permanence"

AN ALLOY IRON

The result of more than twenty years of research,—Toncan Iron—a true alloy of pure iron, copper and molybdenum.

PIPE THAT RESISTS RUST

Not to the inclusion of foreign non-metallics does Toncan Iron owe its long life, but to a structure in which every tiny grain of alloy metal is, in itself, highly resistant to rust.

AND CORROSION

Under the most adverse conditions,—in corrosive soil, in wells producing sulphur laden oil, in oxygenated water lines, in steam lines, in condensers, in refineries, in coal mine service,—Toncan has proved its economy.

THREADS CLEAN AND FAST

The uniformity of Toncan Iron throughout its entire wall thickness insures positive ease of threading. No more effort is required than for threading any soft steel pipe.

AND WORKS EASILY

Since the structure of Toncan Iron is uniformly close grained and non-fibrous, this modern pipe can be bent, coiled, belled, flared, Vanstoned and otherwise worked with ease and satisfaction.

REG. U.S. PAT. OFF.
TONCAN
COPPER
MO-LYB-DEN-UM
IRON PIPE

As protection to you we mark it BLUE

REPUBLIC STEEL CORPORATION
YOUNGSTOWN, OHIO

Birmingham Boston Buffalo Chicago Cincinnati Cleveland
Dallas Denver Detroit El Paso Los Angeles New York
Philadelphia Pittsburgh San Francisco Seattle St. Louis

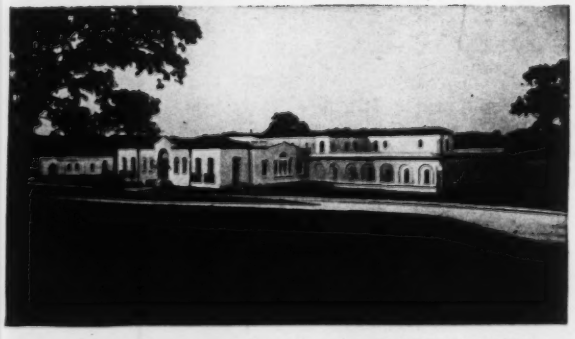
DORRCO

Gas Collection in Dorr Digesters

.... in separate sludge digestion sewage treatment plants.

In the separate sludge digestion plant of the Sanitary District of Aurora, Illinois, three gas collection type Dorr Digesters are used for digestion of sludge. Gas production at this plant has been more than sufficient for requirements. In the month of February the lowest temperature recorded in the Digester was 70° F. In April the average was upwards of 80° F.

In addition to regulating the temperature of the sludge in the Digesters, the heat generated by combustion of the gas is used for heating the main plant building, which consists of laboratory, office, locker rooms, pump station, garage and boiler rooms.



The plant at Aurora was designed by Alvord, Burdick & Howson, Chicago. In addition to the three Dorr Digesters, a Dorrco Bar Screen, Dorr Detritor and four Dorr Clarifiers are installed

Considering the fact that results similar to those at Aurora are being obtained at separate sludge digestion plants in all parts of the country, it is not surprising that this method of treatment is being selected so frequently by leading engineers for both large and small sewage treatment projects.

Ask our nearest office for a copy of the new edition of our booklet, "Modern Sanitary Engineering Practice" and also bulletin 6691, the Dorr Digester.

DENVER, COLO. 1009 17th Street
CHICAGO, ILL. 333 North Michigan Avenue
LOS ANGELES, CAL. 108 West 6th Street
WILKES-BARRE, PA. Miners Bank Building
ATLANTA, GA. 1503 Candler Building
TORONTO, ONT. 330 Bay St.

THE DORR COMPANY
ENGINEERS
247 PARK AVENUE NEW YORK CITY
INVESTIGATION TESTS DESIGN EQUIPMENT

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LONDON
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BERLIN
Dorr Gesellschaft m. b. H. Kielganstr, 1 W. 62
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Societe Dorr et Cie 26 Rue de la Pepiniere
JOHANNESBURG, S. A.
E. L. Bateman Locarno House

JUST WHAT DO YOU WANT A CLAMSHELL BUCKET TO DO?

If Your Demands Are Here . . . You'll Want To Know More About An Owen . . . .

If you want a bucket that will tackle every job you give it, and get through with it in the shortest time—

If you want a bucket that digs straight down, deep into the material, grabs a capacity load every time, dumps clean—with no waste motion—

If you want a bucket that does a "bigger day's work than any other bucket of the same weight and capacity" and that, assured by positive guarantee—

If you want a bucket that stands up under hard work with no breakage, and that gives longer life—

If you want a bucket that pays for itself in time saved and extra yardage—

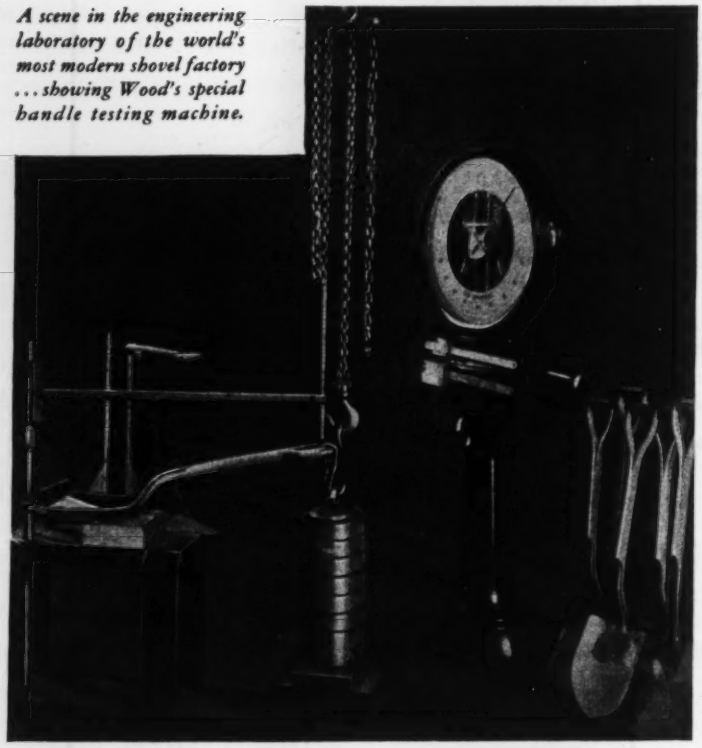
You'll want an Owen—because Owen Buckets are making good in all of these requirements for satisfied owners, everywhere.

Jot down the particular kind of work a clamshell bucket must do for you and we'll send you some valuable data on the Owen that will pay for itself doing it for you.

The Owen Bucket Co., 6011 Breakwater Ave., Cleveland, O.

Owen Buckets

A MOUTHFUL AT EVERY BITE



A scene in the engineering laboratory of the world's most modern shovel factory ... showing Wood's special handle testing machine.

Careful Testing Assures Wood's Quality

THE chances of a Wood's "Moly-D" handle breaking in service are less than one-half of one per cent. Out of the thousands of dozens of these handles in use, only a negligible percentage has been replaced.

Only select, straight-grained, second-growth northern white ash, air-seasoned for six to nine months is good enough for "Moly-D" handles. Note how they are made ... how all strain comes *across* the *grain* ... how a cold-pressed steel band holds the spindle tight as long as the shovel lasts.

"Moly-D" handles are recognized by users as the strongest, most comfortable shovel handles on the market, today ... made extra wide and roomy, there are no rough corners to hurt knuckles. No cold metal to touch hands. Every detail of the "Moly-D" is designed with the one idea of FASTER, EASIER SHOVELING. Priced no higher than the rest.

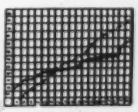
THE WOOD SHOVEL AND TOOL COMPANY
PIQUA, OHIO

Wood's Shovels

"Moly"—"Big Fist"—"Piqua"

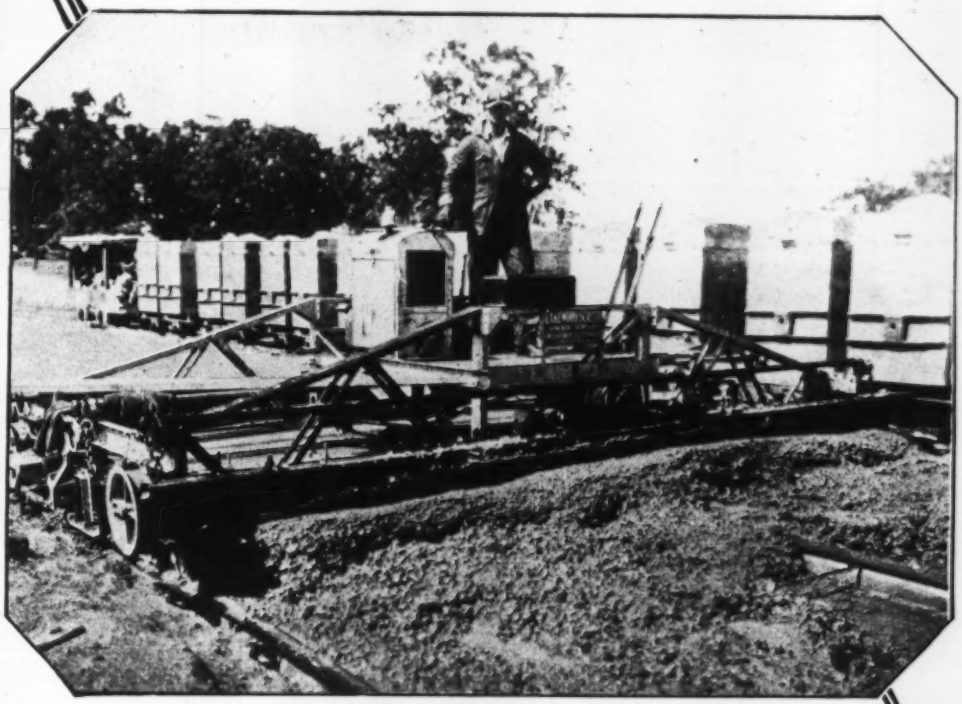
8 Checking Points *for the* Shovel Buyer

Don't take our word for it. Conduct your own comparative tests—bearing in mind these eight vital points.

1		Hardness and Toughness
2		Balance
3		Grip
4		Step
5		Uniformity
6		Service Record
7		Reliability of Dealer
8		Reputation of Manufacturer

Averaging More Than 1200 Feet Smooth Pavement Per Day

Lakewood Type C. Finisher with Tandem Screed



A Lakewood Tandem Type C. Screed is making this record on a job in Indiana. The contractor is J. C. O'Connor and Sons of Ft. Wayne, Ind.

The two Screed members, each 12 in. wide and with tilting adjustment make this big production of smooth pavement possible.

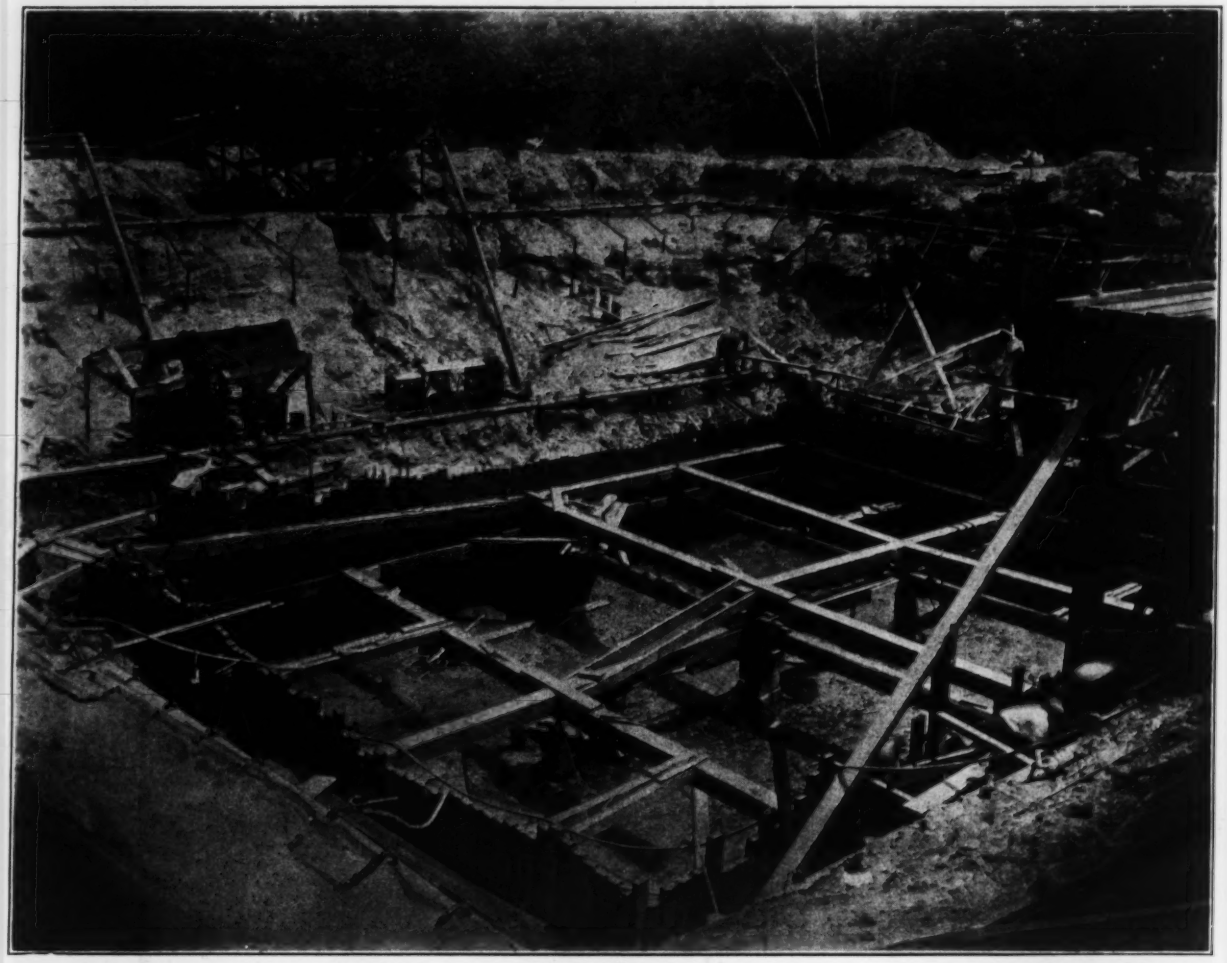
Type C. Machine gives you a choice of Single Screed, Tandem (Double) Screed or a combined screed and tamper operation.

Write for details of this modern Mechanical Screed.

EXPORT OFFICES: 30 Church St., New York City • • CABLE ADDRESS: Brosites

LAKEWOOD

The Lakewood Engineering Co., CLEVELAND · O.



THE DIFFERENCE

Last week we described this North Hackensack Sewage Disposal Plant. Now we want to briefly compare the cost of doing this work with a FOUR-PUMP MORETRENCH WELLPOINT SYSTEM and sloped banks, as against Steel Sheeting and open pumping methods.

The water has to be pumped either way, so we shall cancel that item on both sides. The Header and Wellpoints cost $6,000.00. As we explained last week, the wood sheeting in the bottom was put in to permit of enlarging the concrete base and was paid for as an extra. So that will not be considered. $6,000.00, therefore, gave this contractor a free hand to dig out and concrete.

The lowest bid for steel sheeting the job was $18,000.00 and this did not include the cost of timbering or of fighting a boiling bottom. *If you are a good contractor we won't have to point out the rest to you!*

The Moretrench Wellpoint System Makes Every Job A Dry Job

Moretrench

MOORE TRENCH MACHINE CO., *Rockaway, N.J.*

CONVEYING EXCAVATORS

WELLPOINT SYSTEM

Then they DUG *it* with the *new* WILLIAMS "Champion!"

21 improvements give greater Digging Power to the new WILLIAMS "Champion."

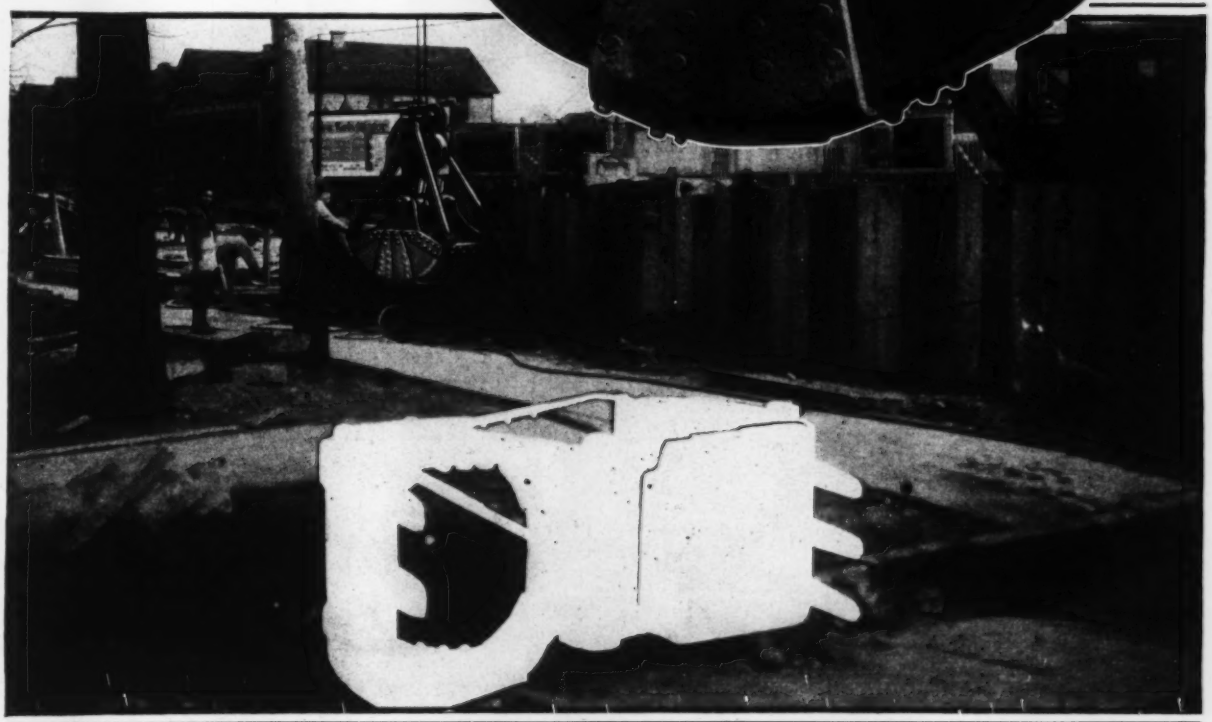
Too hard for their bucket to dig—so they got a new WILLIAMS "Champion," and went right through it.

When you have digging that's too hard for your clamshell, get a new WILLIAMS "Champion."

Definitely guaranteed to outdig any other bucket.

Make your own tests and comparisons. Write us—we'll make the arrangements.

G. H. WILLIAMS CO.
601 Haybarger Lane
Erie, Pa.



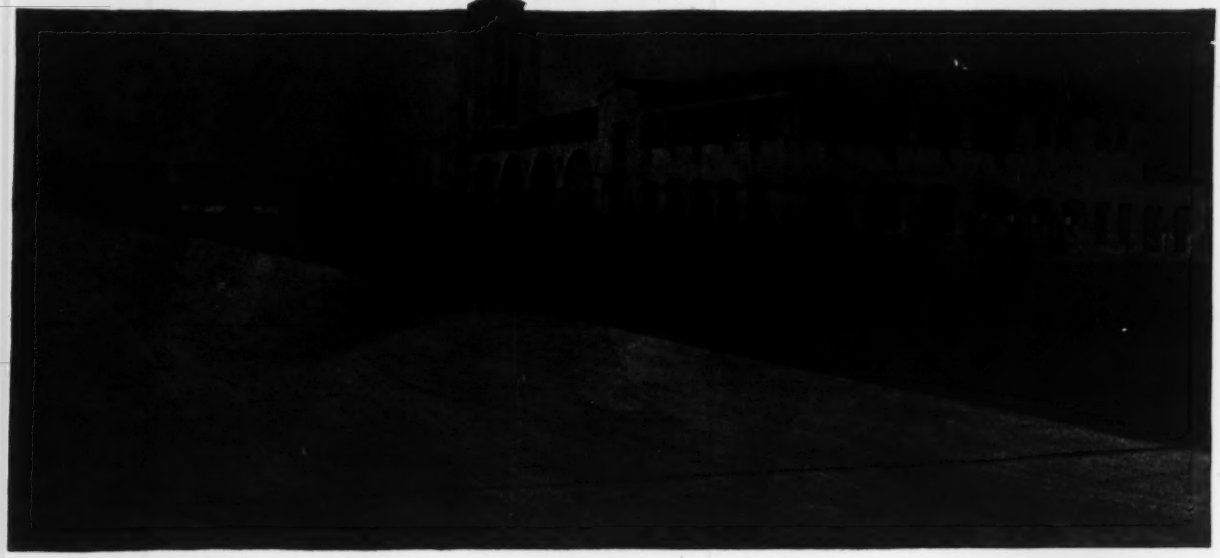
Another case where the new WILLIAMS "Champion" proved to be the better digger. "A real Champion welcomes competition."

WILLIAMS
BUCKETS—TRAILERS

"The Dynamite's in the Bucket"

193

They provided for the inevitable *expansion and contraction* strains



A typical installation. This large Pacific Coast airport protects its runways, warming-up aprons, sidewalks and hangar floors with Carey Elastite Expansion Joint.

HERE'S an airport runway that won't bulge or buckle with weather changes. It will remain surface-smooth for years. The airport construction engineers saw to that when they protected the concrete with Carey Elastite Expansion Joint.

The pioneer Carey Elastite Expansion Joint, now widely used in airport properties everywhere, is preformed under heavy pressure—compounds of asphalt and fibre, sandwiched between sheets of asphalt-saturated felt. Flexible, readily applied around curves—never brittle nor runny at any temperature. Economical, indispensable, in all concrete construction work. Write for particulars on Expansion Joint installation.

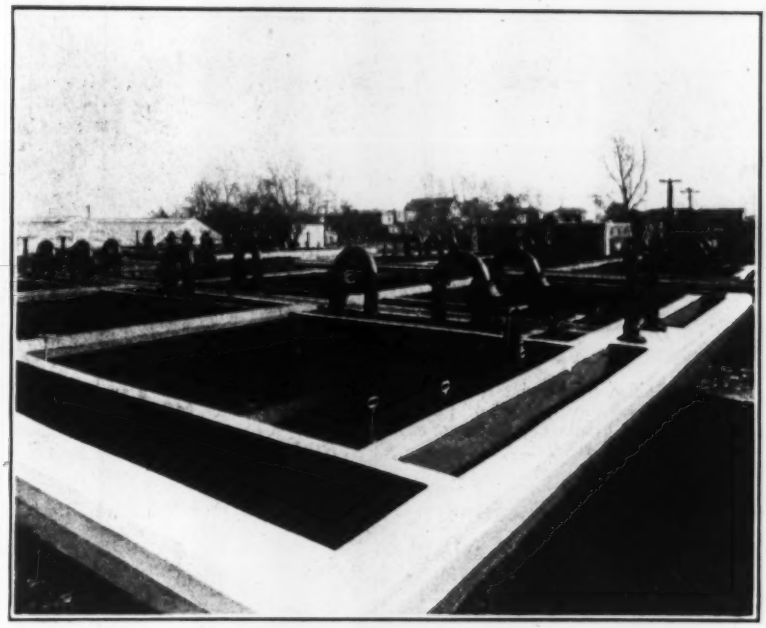
THE PHILIP CAREY COMPANY
Lockland, CINCINNATI, OHIO

Philip Carey Products

For Aviation Field Service:

Corrugated Asbestos Roofing and Siding, Carey Asbestos and Magnesia Heat Insulations, Carey Asbestos and Asphalt Built-up Roofing, Carey Elastite Asphalt Planking, Carey Elastite Asphalt Water-proofing.

INERTOL



North Sewage Treatment Works of the City of Camden. Engineers—Remington, Vosbury & Goff. Contractor—Eugene F. Verga. INERTOL used on Imhoff tanks, Channels, Piping and Sludge Beds.

THERE are three main reasons why Engineers specify INERTOL on Sewage Treatment Works. (1) For protecting the Concrete against sewerage in gas and liquid form. (2) For the sake of cleanliness, since an INERTOL film is much easier to clean than rough Concrete. (3) For making the Concrete watertight.

Remington, Vosbury & Goff of Camden is one of the leading engineering firms specifying INERTOL. In addition to the Camden plant shown above, they specified our product on the Sewage Works at Barrington, Bridgeton, Erlton, Mt. Ephraim and Merchantville-Pennsauken, N. J. Also on the plant at Reading, Pa.

Write today for complete data.

FOR CONCRETE

Fight disintegration of concrete and corrosion of steel with

INERTOL

FOR STEEL

INERTOL CO., Inc.
253 Broadway
New York
N. Y.

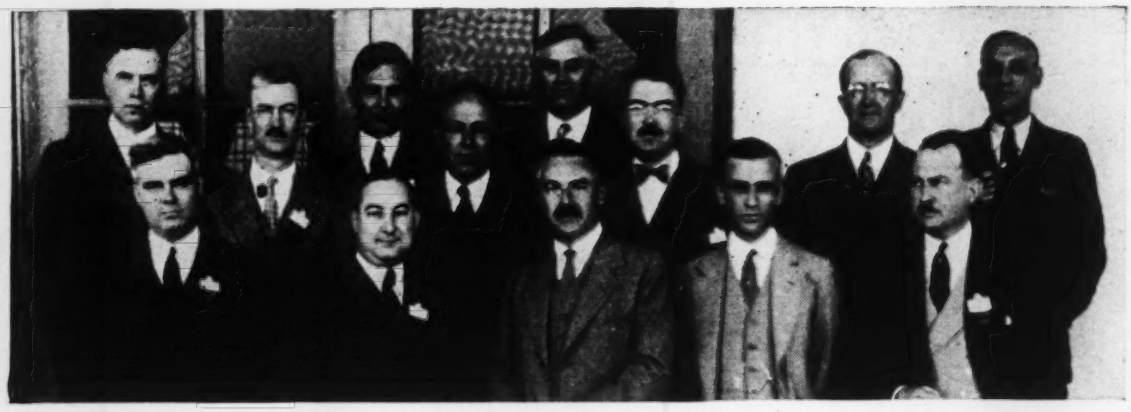
INERTOL COMPANY, INC.

253 BROADWAY **NEW YORK CITY**

STRUCTURAL STEEL CREATED THE SKYSCRAPER

MEET THE DISTRICT ENGINEERS

of the American Institute of Steel Construction



BACK ROW, left to right, Lee H. Miller, chief engineer; district engineers, W. E. Emmett, San Francisco, and Henry Penn, Chicago. SECOND ROW, district engineers, J. N. Keenan, New York; Ernest N. Adams, Worcester, Mass.; James G. Allen, Birmingham, Ala., and Alexander Miller, Cleveland; F. H. Frankland, director of engineering service. FRONT ROW, district engineers, L. H. Dodd, Dallas, Tex.; B. F. Hastings, Philadelphia; C. Curtis Tracy, Milwaukee; C. W. Harding, St. Louis, Mo.; and Jack Singleton, Topeka, Kan.

THE engineers of the American Institute of Steel Construction are co-operating with local engineers, architects, fabricators, public officials, financiers and all others interested in structural steel. They never compete with architects and engineers, and their offices are entirely separate from those of local fabricators' associations or individual fabricators.

They are lending a helping hand wherever it is needed. They are promoting uniform practices in the design and distribution of structural steel. They are responsible for an ever-widening acceptance for the Institute's Code of Standard Practice, the Fireproofing Specification and the Standard Specification for the design, fabrication and erection of structural steel. They are thus helping the various factors in construction, including the owner, to save millions of dollars a year. They are at your service.

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The co-operative non-profit service organization of the structural steel industry of North America. Through its extensive test and research program, the Institute aims to establish the full facts regarding steel in relation to every type of construction. The Institute's many publications, covering every phase of steel construction, are available on request. Please address all inquiries to 200 Madison Avenue, New York City. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas and San Francisco.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

STEEL INSURES STRENGTH AND SECURITY

Are You Getting 100% Hose Service?

Users of air hose are entitled to 100% service. Ingersoll-Rand hose is made to give this service.

It is built to meet specific conditions on the job, and it is noted for its toughness and long life.

I-R hose is scientifically made in both the braided cord and wrapped fabric types. To help you select the proper style for your job, we shall be glad to have an I-R representative go over your hose problem. *Be sure you are getting maximum hose economy.*

Super-quality Braided Cord Hose

High-grade Wrapped Fabric Hose

Super-quality Wrapped Fabric Hose

RUFFIAN

A brown rubber-covered hose for quarries, mines, contracting, and general rock drill work. Built to stand up under severe wear, abrasion, kinking and crushing, and to counteract the effects of heat and oil in the air.

ANTIPEEL

A strong, light, flexible hose for general pneumatic tool work. Particularly suitable for railroad right-of-way use. Built to resist the effects of heat and oil under average operating conditions. This hose is an exceptional value for the money.

I-R AIR DRILL

An extra-strong, tough hose for general use with rock drills, pneumatic tools, and other compressed air devices. Built to resist severe outside wear and abrasion, and to offer the maximum resistance to oil and heat in the air.

INGERSOLL-RAND COMPANY - 11 Broadway - New York City

Branches or distributors in principal cities the world over
For Canada Refer—Canadian Ingersoll-Rand Co., Limited, 10 Phillips Square, Montreal, Quebec

Ingersoll-Rand

2-H

Steel Products for Contractor and Builder

Ryerson Combined Service on All Steel Products Saves Time, Money and Trouble

The Special Contractors and Builders Division of Ryerson Steel-Service is without parallel in the building fields. This department has its own warehouses and provides complete service on all reinforcing for concrete, including bars, spirals, triangle mesh and electric welded fabric, etc. Steel joists, metal lath, and all the various steel building products are also included.

In addition, structurals, bars, plates, sheets, rivets, bolts, wire, etc., are furnished from the general steel departments. Trench braces, jacks, electric drills, and hundreds of other tools needed on every job are supplied by the machinery and small tool departments.

Contractors use the Ryerson Warehouses as if they were their own. Reinforcing steel, lath, and other miscellaneous materials are kept under cover until they are ready to use each item. Delivery is according to their schedule. Large fleets of trucks and private switch tracks help provide service unequalled by any other sources of supply.

All types of jobs are figured and lump sum or pound price quotations prepared.

Write for complete information.

JOSEPH T. RYERSON & SON INC.

Plants: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City
Representation in: Minneapolis, Rockford, Kansas City, Tulsa, Houston, Dallas, Newark, New York, Denver, Los Angeles, San Francisco

RYERSON
STEEL-SERVICE

CONSTRUCTION NEWS

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	Project	Cost	Status
Bridges			
St. Louis	Bridge	$4,000,000	Proposed
Pt. Isabel (Tex.)	Causeway	1,000,000	Bids asked
Excav. and Dredging			
Pt. Isabel (Tex.)	Channel work, etc	4,783,000	Proposed
Railways			
Missouri	Elevated railroad	1,500,000	Contract
Factories and Mills			
Wichita (Kan.)	Factory	1,000,000	Contract
Warehouses			
Jersey City	Warehouse and pier	8,000,000	Contract
Power Plants			
Bagnall (Mo.)	Power plant equip	1,000,000	Contract
Indianapolis	Super power station	12,267,075	Proposed
Federal Government			
Muskegon (Mich.)	Breakwater	1,062,450	Contract
Buildings			
Los Angeles	Apartment	1,800,000	Contract
San Francisco	Apartment	1,500,000	Contract
Atlantic City	Hotel	1,000,000	Contract
New York	Apartment	3,000,000	Contract
New York	Apartment	1,250,000	Separate contract
Malden (Mass.)	Hospital	1,200,000	Proposed
Philadelphia	Hospital	1,000,000	Contract
Cleveland	Hotel	4,000,000	Contract
Kansas City	Bank	1,000,000	Proposed
Pittsburgh	Church	1,000,000	Proposed
New York	Y. M. C. A.	2,000,000	Proposed
Rochester	Club	1,000,000	Contract
Los Angeles	Office	3,000,000	Proposed
Des Moines	Office	2,000,000	Contract
New York	Office	2,000,000	Proposed
Pasadena (Calif.)	Auditorium	1,050,000	Proposed
New Haven	University	1,000,000	Contract
Chicago	High school	1,252,142	Contract
Evanston (Ill.)	University	1,000,000	Proposed
Newark (N. J.)	Institute	5,000,000	Proposed
Los Angeles	Theatre	2,000,000	Proposed
Davenport (Iowa)	Theatre	1,500,000	Proposed
Lawrence (Mass.)	Theatre	1,000,000	Proposed
Milwaukee	Theatre	1,000,000	Proposed
Philadelphia	Temple music, etc	4,000,000	Proposed

WATERWORKS

PROPOSED WORK

Conn., Meriden—City, J. T. Toner, supt. P. Wks., 1 story, brick pumping station. $40,000. C. P. Prann, city engr.

Mass., Natick—Town, Bd. Selectmen, relaying waterworks, Central St. $34,230 appropriated.

Miss., Hattiesburg — Waterworks on Boule River, incl. 14 deep wells, aerator, filtration plant, 15 m.g.p.d. reservoir. T. H. Allen, 65 McCall St., Memphis, Tenn., engrs.

O., Cincinnati—Hamilton Co., Water Supply Line 145, incl. 40,387 ft. 6- to 10-in. c.i. pipe, 21 tons castings, 1,000 cu.yd. rock excav. $86,395. C. S. Raffety, Court House, engr.

Okla., Oklahoma City — Preliminary plans main extensions in west portion city. $150,000. W. W. Small, City Hall, engr.

Okla., Vinita — Preliminary plans extending 11,000 ft. 8 in. c.i. mains, to Oklahoma State Hospital. $20,000. F. C. Cowell, Vinita, engr.

Utah, Bountiful — City pipe line to convey water down Mill Creek, Canyon. $30,000. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs.

Ont., Swansea — Village, 6 in. c.i. mains, valves, hydrants in Armadale, Chestnut, Maple, Mayfield, Larking and Yule Aves., Kingsway Area. $21,685. Wynne-Roberts Son & McLean, Metropolitan Bldg., Toronto, engrs.

Ont., Westboro—Nepean Twp. soon takes bids waterworks, sewerage system at Stevenson Pl. $750,000.

BIDS ASKED

Conn., Putnam—July 1, by R. F. Thurston, water comr., Town Hall, laying c.i. water pipe, furnishing pipe, appurtenances. $40,000. H. A. Symonds, 70 State St., Boston, Mass., engr. Noted Jan. 30.

Md., Baltimore — July 2, by Bd. Awards, mains in Carnegie Ave. from Holabird Ave. to Willow Spring Rd. and in Willow Spring Rd. from Carnegie to St. Helena Aves. E. G. Bost, Municipal Bldg., water engr.

New York—July 15, by Bd. Water Supply, G. J. Gillespie, pres., 346 Bway., ten 48 x 36 x 36 in., one 48 x 36 in., and twenty-two 72 x 48 x 48 in. shaft caps, appurtenances for City Tunnel 2; adv. E. N.-R. June 26.

Okla., Holdenville—July 1, by J. Kirk, city clk., 24,600 ft. 4- to 8-in. c.i. main extensions. $30,000. C. H. Edge, Holdenville, engr. Noted June 12.

Pa., Baden—June 30, by G. Black, pres. Water Comn., Boro Bldg., steel water tank, 60 ft. high, 27 ft. diam., incl. foundations, connections.

Tex., Brownsville—City taking bids 4 m.g. water filtration plant. $125,000. Morey & Morey, Praetorian Bldg., Dallas, and Brownsville, engrs. Noted June 12.

Ont., Brantford—June 27, by Chairman Water Comn., Tender A, mechanical equipment for 6 m.g. filter plant; Tender B, gate valves, check valves, foot valves, sluice gates; Tender C, elevated wash water tank. $30,000. F. P. Adams, city engr. H. G. Hunter, 1112 Dominion Sq. Bldg., Montreal, Que., consult. engr.

Ont., Toronto — June 30, by B. S. Wemp, mayor, 5,760,000 imperial g.p.d. centrifugal pump with electric motor. $5,000. R. C. Harris, City Hall, engr.

Ont., Toronto—July 29, by B. S. Wemp, mayor, City Hall, high level pumping station, incl. two 24 m. (imperial) g.p.d., two 10 m. (imperial) g.p.d. centrifugal pumps with induction motors, control equipment. $50,000. R. C. Harris, City Hall, engr.

CONTRACTS AWARDED

Kan., Moline — Waterworks improvements, incl. 8,000 ft. 8 in. c.i. pipe, 300 g.p.m. pump complete filament equipment, earthdam, concrete well, concrete sluiceway, intake, spillway, to Sherman Machine & Iron Wks., 18 East Main St., Oklahoma City, Okla., $38,273. Noted June 5.

N. J., Allendale—Boro Council, Boro Hall, wells for water distribution system, to J. P. Harris, Ridge St., Port Chester, N. Y.; pump stations, equipment, to Columbia Contg. Co., 104 Bway., New York; pipe lines, valves, hydrants, to Magharo & Mercadante, South Orange; elevated steel tank, to Chicago Bridge & Iron Wks., 30 Church St., New York. Noted May 8.

N. J., New Brunswick—City Comn., City Hall, pumping station, to T. H. Flynn, 344 Georgia St., $21,730; 3 centrifugal electric driven and 1 gasoline driven pumps, to American Well Wks., Peoria, Ill., $24,000. Noted May 15.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Putnam and East Hollywood Aves., to W. F. Norton, 510 West 149th St., $12,739. Noted June 19.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Edgecombe, Madison Aves., to Knidem Constr. Co., 4197 Park Ave., $75,780; Lexington and 9th Aves., to Bronx Water Wks., 1 Riverdale Ave., $55,900. Noted June 19.

N. Y., Seneca Falls—Bd. Water Comrs., 1,700 meters, to Neptune Meter Co., 50 East 42nd St., New York, $24,000.

Wash., Tacoma — City Comn., constructing 10,898 ft. 42 in. steel pipe for gravity pipe line, to Birchfield Boiler Co., 2503 East 11th St., $91,074.

Wis., Wauwasota—City, W. T. Whipp, clk., pumps, boosters, controls, for booster station, to Layne-Northwest Co., 1023 Wells St., Milwaukee, $10,613.

SEWERS

PROPOSED WORK

Ind., Gary—Bd. P. Wks., sanitary sewers in Adams and Washington Sts. $40,000. J. Hayes, Gary, engr.

Kan., Abilene — Outfall sewerage system, $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mich., Lake Odessa — Village complete concrete, vitr. sanitary sewerage system, disposal plant, $50,000. Francis Eng. Co., Eddy Bldg., Saginaw, engrs.

Mo., St. Louis—Bd. P. Serv., City Hall, preliminary plans Blendon Pl. Sewer, storm and sanitary sewerage system to serve district west of McCausland Ave. between Manchester Ave. and Arsenal St. $200,000. W. W. Horner, city engr.

N. J., New Brunswick—Bd. City Comrs., City Hall, preliminary plans sanitary sewer in Jersey Ave. near Mile Run. $25,000. A. Atkinson, city engr.

N. J., Union—Twp. Com., Township Hall, preliminary plans sanitary sewerage system in Hawthorne St. $25,000. H. Kreb, Jr., Falls Bldg., twp. engr.

N. Y., Elmsford—Village bids after July 15, general contract vitr. clay sewers. $25,000. Denehy & Clarke, 35 Mamaroneck Ave., White Plains, engrs.

N. Y., Pen Yan—Surveys sewage disposal plant. W. S. Lozier, Inc., 10 Gibbs St., Rochester, engr.

O., Lima—Sewage disposal plant, river improvements. H. P. Jones & Co., 2nd Natl. Bank Bldg., Toledo, engrs. Noted Dec. 19.

Pa., Royersford—Complete sanitary sewerage system, sewage pumping station, disposal plant. $400,000. Remington, Vosbury & Goff, Camden, engrs.

R. I., Providence—City, Bd. Contr. & Supply sewerage works in Aquidnick, Blaine, Frank, Margan and Plymouth Sts. $25,000 or more.

S. D., Rapid City — For 88 blocks sanitary sewers, $50,000. J. P. Sodestrom, city mgr.

Tenn., Brownsville—Bd. Comrs. Haywood Co., J. O. Bomer, pres., complete sewerage system.

Tex., Beaumont—Taking bids 30 in. vitr. or concrete sanitary sewers in Kenneth, Sabine Pass and Euclid Sts. $60,000. R. C. Black, city engr.

Tex., New Braunfels—For 9,000 ft. 18- to 30-in. sewers, $15,000 pipe. R. S. Jahn, city engr.

Ont., Fort William — For 8 in. vitr. tile sewers. $47,000. C. B. Symmes, City Hall, engr.

Ont., Hamilton—City, 8 in. vitr. tile sewers in Dundas St., Main St. southerly, James St. between Fennel Ave. and Mountain Brow. $26,750. W. L. McFaul, City Hall, engr.

See proposal advertising on page 116

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LEADITE

Laying 72-in. C. I. Bell and Spigot Pipe with LEADITE Joints

Joint Efficiency and Installation Economy

—the "reason why" Water Works Men most everywhere—Specify and Use LEADITE

Over a quarter of a Century's use has proven that LEADITE makes as tight a joint as possible (*water waste surveys prove that Leadite makes very tight joints*),—and that it is Economical to use, for the following reasons: (1) Saves in cost of material (2) Saves Labor usually required for caulking (3) Saves labor item for digging large bell holes (4) Reduces time required for pumping wet trenches (5) Saves in time of preparation, because it melts at a low temperature (6) Saves in handling charges on the job, because it is light and easy to handle (7) Saves in freight and hauling charges, because it is light.

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Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.

No Caulking

Sewers (Continued)

Ont., Waterloo—City Council retained James, Proctor & Redfern, engrs., 36 Toronto St., Toronto, in connection with rein.-con. sewage disposal plant. $25,000-$50,000.

Ont., Westboro—See "Waterworks."

Ont., York Twp.—For 3,000 ft. vitr. tile sewers in Eglinton Ave. W., Hertford, Landau, Roselawn Aves. $25,000. F. B. Goedike, 40 Jarvis St., Toronto, engr.

BIDS ASKED

Ala., Montgomery—July 1, by City, W. A. Gunter, mayor, Southern Outfall Sanitary Sewer. J. M. Garrett, city engr.

Conn., New Canaan—July 1, by Bd. Burgesses of Boro of New Canaan, L. B. Sutton, warden, extending sewage treatment works. T. F. Bowe, 110 William St., New York, consult. engr.

Ill., Chicago—July 2, by City, at office Bd. Local Impvts., City Hall, brick and tile sewers, brick manholes, catch basins in West 55th St., South Mason, South Mansfield, South Menard, South Massasoit, South Parkside, South Archer, South Luna, South Linder, and South Lotus Aves. M. J. Faherty, pres.

Ill., Rockford—July 15, by Bd. Trustees Sanitary Dist. of Rockford, 130 North 1st St., G. H. Boehland, pres., Div. P, two 14 m.p.d. and two 22 m.p.d. centrifugal pumping units, 2 hot water circulating pumping units, 2 sump pumps, 1 sludge pumping unit; Div. Q, switchboard, wiring, other electrical appurtenances. Former bids rejected. Noted May 1.

Ind., Ft. Wayne—July 1, by Bd. P. Wks., City Hall, Resolution 62 Main Sewer, Local Sewers 452 and 453. $43,000. F. M. Randall, Ft. Wayne, engr.

Me., North Haven—July 1, by Bd. Selectmen, 1 mi. 6 in. sewer line. Noted May 22.

Md., Baltimore — July 2, by Bd. Awards, sanitary sewerage system, and sewage treatment works at Fort Smallwood, Anne Arundel Co.; storm drains, Storm Water Contr. 150. M. J. Ruark, Municipal Bldg., sewerage engr.

Mass., Ludlow—July 8, by Sewer Comrs., W. A. Sedelow, chn., 3¼ mi. trunk and lateral sewers with all appurtenances. P. L. Wood, engr.; adv. E. N.-R. June 26.

N. J., Kenilworth—July 1, by Boro Council, Boro Hall, vitr. stoneware and c.i. sewers, 15 in. and less. Bauer, Kling & Coudert, 120 Broad St., Elizabeth, boro engrs.

N. J., Maplewood (br. South Orange)—June 28, by Twp. Com., Township Hall, 300 ft. 4 in. vitr. tile sanitary sewer, 360 ft. 1 and 1¼ in. water pipe; 360 ft. light service conduit. $25,000. H. W. Heilman, 9 Highland Ave., twp. engr.

N. Y., Central Islip — July 16, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, sewage pumping stations at Central Islip State Hospital.

O., Cuyahoga Falls—June 30, by J. G. Murray, dir. Service, 2 mi. vitr. clay storm sewer Gorge Dist. $32,000. Barstow & McCurdy, 31 North Summit St., Akron, engrs.

O., Sebring—Bd. Control bids about Sept. 5, sewerage system, $163,570. L. T. Fawcet, 2728 Hudson Ave., Youngstown, sanitary engr. of Mahoning Co. C. C. Harmon, Canton, advisory engr.

Okla., Holdenville—July 1, by J. Kirk, city clk., 36,000 ft. 8- to 15-in. concrete sanitary sewer extensions. $75,000. C. H. Edge, Holdenville, engr. Noted Jan. 2.

Okla., Lawton—July 1, by City Clerk, sanitary sewers. $50,000. F. E. Lawrence, Lawton, engr. Noted Mar. 27.

Okla., Prague—July 7, by L. Newhouse, city clk., 14,000 ft. 8 in. vitr. clay sanitary sewers in McCulley Addition. $25,000. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

Pa., Phila.—July 2, by Dpt. P. Wks., Bureau Eng. & Surveys, A. Murdock, dir., City Hall Annex, Schedule A, branch sewer; Schedule B, main sewer, Harrocks St.; Schedule C, sewage disposal plant, interception of Whitaker Ave. and Ruscomb St. sewers at Tacony Creek; Schedule D, bridge on line of "B" St. under connecting railway.

R. I., Woonsocket—July 1, by Special Com. on Sewage Disposal, City Hall, sewage disposal plant. Remington, Vosbury & Goff, Camden, N. J., engrs.

Tex., Bryan—July 2, by City, sewage disposal works, incl. altering present Imhoff tank, constructing new preliminary and final settling basins, with mechanical sludge collectors, new aeration chamber, new separate sludge digestion tank. E. J. Jenkins, mayor.

Wash., Seattle—Bd. P. Wks. bids about June 27, 11,000 lin.ft. 8- to 14-in. triple tile sewer in Lakeside Ave. et al. $140,000. W. D. Barkhuff, city engr.

CONTRACTS AWARDED

Ala., Birmingham—City Comn., ¾ mi. 16 in. vitr. clay storm sewer in Ivanhoe Section, to J. B. McCreary Co., American-Traders Bldg., $27,849 est. $51,125; 8 in. c.i. sanitary sewer 1 block 20th Alley, to United Contg. Co., American-Traders Bldg., $499 est. $640.

Ill., Rockford—Bd. Trustees Sanitary Dist. of Rockford, 130 North 1st st., G. H. Boehland, pres., Div. R, 2,000 ft. 60- to 72-in. sewers, to Swords, McDougal & Lancaster, Peoria. Noted May 1.

Ind., Indianapolis—Bd. Sanitary Comn., City Hall, Pogues Run and Sect. 1 Broad Ripple Interceptor Sewers, to Krenn-Dato Constr. Co., 4216 College St., $29,875 and $90,311 respectively; Sect. 2 Broad Ripple Interceptor Sewer, to Swords-McDougal-Lancaster Co., Peoria, Ill., $134,263. Grand total $254,449.

Md., Baltimore—City, City Hall, 1 story, 46 x 129 ft., brick, concrete, salt glazed brick, ornamental terra cotta and cut stone pumping station in Druid Hill Park, to Consolidated Eng. Co., 20 East Franklin St., $129,700. Noted May 22.

Mass., Boston—Dpt. P. Wks., sewerage works, Swallow St., West Roxbury, to L. P. Federico & Susi Co., 43 Westwood St., Dorchester. Est. $25,000. Noted June 5.

Mass., Boston—Metropolitan Dist. Comn., 1 Ashburton Pl., South Metropolitan System, Sect. 113, New Neponset Valley Sewer, to A. Baruffaldi, 52 Powder House Blvd., Somerville, $121,800. Noted June 5.

Mass., Dedham — Bd. Sewer Comrs., Town Hall, 2,900 ft. 8 in. sewerage works, to P. DeCristofaro, 38 Glendower Rd., Roslindale. Est. $25,000. Noted May 29.

Mass., Medford—City, sewers, watermains in 20 acre real estate development, Old Mystic Park, off Mystic Ave. To exceed $25,000. Owner builds.

Mich., Dearborn — Concrete and vitr. lateral sewers, brick, concrete manholes, Dist. 311, to W. G. Hoy Co., 12934 Evergreen Ave., Detroit, $63,197.

Mo., Kansas City—City, sanitary sewers in Dists. 570, 571, 572, 594, 595, Div. 6, to Boyle Constr. Co., 226 West 39th St., $51,455.

N. J., Newark—Bd. City Comrs., storm water sewer in State Hy. Route 25 and Port St., to M. Saggese, Inc., 233 Baldwin St., Glen Ridge, $37,193. Noted May 29.

O., Cleveland—Cuyahoga Co., sewer in Brookpark Rd Impvt. Dist. 123, Sect. B, to Joseph Kalill & Jackson, 13011 Triskett Rd., $126,370. Noted May 15.

O., Cleveland—For 388 ft. 24 in. vitr. tile sewer in Arlington Ave., to C. W. Jackson, 1221 Lakeland Ave., Lakewood, $3,849; 1,635 ft. 18- to 24-in. vitr. tile, 360 ft. 4 "C" and 910 ft. 3 "C" brick sewers in Clinton Ave., to Amata Constr. Co., 3610 East 151st St., $20,492.

O., Garfield Heights (br. Cleveland)—Village, sewer, watermain, connections, in 4 streets, to D. Rossi-Marcelletti Co., 1700 Willard Ave., Cleveland, $26,684. Noted June 5.

Okla., Tulsa—City Comn., Storm Sewer Project 9-C-30, mono rein.-con., to Standard Paving Co., 2119 East 11th St., $29,030. Est. $39,525. Noted May 22.

Pa., Phila.—Dpt. P. Wks., Bureau Eng. & Surveys, City Hall, Schedule C, Sewage Disposal Project, Lower Frankfort Creek Low Level Collecting Sewer, to Silas Mason Co., 52 Vanderbilt Ave., New York, $629,022.

Tex., Big Springs—City, c/o V. R. Smitham, mgr., sewage disposal plant, to Williams-Jacobson, Rule Bldg., Amarillo, $55,000. This corrects report in June 12 issue under "Contracts Awarded."

Tex., Houston—Sewers in Washington St., to Elder Constr. Co., 4714 Jack St., $34,514; San Felipe St., to McLendon & Green, 1st Natl. Bank Bldg., $5,102.

Tex., Port Arthur—City Comn., c/o J. W. O'Neal, mayor, 7,114 ft. 12 to 36-in. rein.-con. storm sewers in Thomas Blvd., to T. J. James & Co., Ruston, La., $170,700. Noted June 5.

Wash., Seattle—Bd. P. Wks., sewers in 28th Ave. N.W., to F. Arcorace, 8423 48th Ave. S., $35,998.

Wis., Milwaukee — Dpt. P. Wks., D. McKeith, comr., mains in North 7th and North 9th Sts., to F. E. Kominski, 745 46th Ave., West Allis, $3,654; East Dewey Pl., East Ganer Circle, South Greely, South Austin, South Burrell, South Carpenter Sts., East Bennett, South Clement and South Pine Aves., to Kehrein Bros., Inc., 1096 23rd St., $7,656; North 58th and 54th Blvds., North 52nd to North 58th Sts. (inclusive), to Werner Co., 721 8th Ave., Wauwatosa, $9,353. Grand total $20,663.

Wis., Milwaukee—Dpt. P. Wks., sewer in Mount Vernon Ave., to Wenzel & Henoch Constr. Co., 5025 State St., $47,307.

Ont., Hamilton — City Council, sewers in Inverness Ave. and James St., also Garge Ave, N., to Stanley Contg. Co., $400 and $90,000 respectively.

WASTE DISPOSAL

PROPOSED WORK

Ill., Elmhurst—City, c/o Bd. Local Impvts., F. W. Newman, secy., soon takes bids garbage incinerator plant. Edwin Hancock Eng. Co., 1509 West Jackson St., Chicago, engrs.

BIDS ASKED

N. J., Atlantic Highlands—July 8, by City 25 ton incinerator, incl. building, stack, ramps. $30,000. Remington, Vosbury & Goff, Camden, engrs.

BRIDGES

PROPOSED WORK

California—Yolo Co. (Woodland) and Sacramento Co. (Sacramento) surveys bridge over Sacramento River at Sutter Island. To exceed $25,000. A. G. Proctor, surv. former and C. Detering, surv. latter counties.

Ill., Joliet—State Dpt. Purchases & Constr., Div. Waterways, Springfield, reconstructing bridges across Des Plaines River at Cass, McDonough, Jefferson, Jackson and Ruby Sts.

Mass., Ludlow—Springfield-Ludlow Engineering Dpt., City Hall, Springfield, bids early in July, bridge over Chicopee River. Waddell & Hardesty, 150 Bway., New York, consult. engrs. Noted May 8.

Mass., Tyngsboro — Comrs. Middlesex Co., soon takes bids steel, concrete bridge, abutments, approaches. To exceed $25,000.

Mo., St. Louis—H. C. Brenner Realty & Finance Corp., c/o H. C. Brenner, 2810 Chippewa St., preliminary plans rein.-con., steel, railroad-vehicular and pedestrian bridge over Mississippi River, vicinity Cherokee and Osage Sts. $4,000,000. Private plans.

N. J., Elizabeth—Bd. Freeholders Union Co., bridge over Elizabeth River, on Summer St. $150,000. Ash, Howard, Needles & Tammen, 55 Liberty St., New York, engrs.

O., Cleveland — Bd. Comrs. Cuyahoga Co., rein.-con. bridge over Baldwin Creek, Wooster Rd. $60,000. A. Felgate, Court House, engr.

O., Cleveland—Comrs. Cuyahoga Co., completing plans structural steel work for Lorain-Central Bridge. Total est. $10,000,000. Wilbur Watson & Associates, 4614 Prospect Ave., engrs.

Pennsylvania — Comrs. Lehigh Co., Court House, Allentown, rejected bids May 29, steel bridge over Lehigh River, Lehigh Valley R.R., Central R.R. of New Jersey and Lehigh Coal & Navigation Co. Canal between Coplay and Northampton. $654,714. Noted May 22.

Virginia—State Hy. Dpt., Richmond, bridge over Nansemond River, near Reids Ferry.

Ont., Becher—Lambton Co. (Sarnia), bids in August steel bridge over Sydenham River. $35,000. J. McCallum, County Bldgs., Sarnia, engr.

Ont., Brampton—Peel Co. soon takes bids Eldorado, Bell's Mills and Clairville Bridges, concrete. $35,000. N. L. Powell, Brampton, engr.

Ont., Sparta—Elgin Co. (St. Thomas), steel for 210 ft., concrete, steel bridge, near here, to London Structural Steel Co., Bursten St., London; concrete work, to H. E. Lavelle, Scott St., Brampton. Total est. $28,000. Noted May 8 under "St. Thomas."

Ont., Toronto—East York Twp., 800 ft. steel truss (deck) bridge on concrete piers and abutments, 60 ft. over Don Ravine, Don Mills Rd. $300,000. G. R. Jack, 443 Sammon Ave., engr.

BIDS ASKED

California—July 9, by C. H. Purcell, engr. State Hy. Comn., Sacramento, bridge to have two 125 ft. steel deck truss spans with concrete deck, four 56 ft. rein.-con. girder spans and two 30 ft. rein.-con. girders spans over Trinity River, near Douglas City, Trinity Co.

Calif., Douglas City—July 9, by State Hy. Comn., Sacramento, bridge to have two 125 ft. steel deck truss spans with concrete deck, four 56 ft. and two 30 ft. rein.-con. girder spans near here, Trinity Co. C. E. Purcell, P. Wks. Bldg., Sacramento, hy. engr.

Ind., Lebanon—Bd. Comrs. Boone Co., taking bids several bridges. $25,439. O. J. Brookshire, Lebanon, engr.

Louisiana — July 1, by State Hy. Comn., Baton Rouge, five 50 ft. rein.-con. girder span bridge on concrete piles on Luella-Kodesh Hy., Project 403, Route 1, Natchitoches and Winn Parishes. H. B. Henderlite, hy. engr.

Massachusetts—See "Streets and Roads."

Michigan—July 1, by G. H. Greene, resident engr., Alpena, SR. Br. 1 of 35-6-21C-3, steel deck girder, concrete floor and wearing surface, Iosco Co., for State Hy. Dpt., Lansing.

Michigan—July 1, by G. H. Greene, resident engr., Alpena, S. R. Br. 1 of 35-6-21-C-4, 2 rein.-con. abutments, steel deck girder, Contr. 4, for fabrication and furnishing structural for one 120 ft. steel truss span, Iosco Co., for State Hy. Comn., Lansing.

Michigan—July 2, by R. A. Beers, resident engr., Kalamazoo, S.R. Br. 1 of 11-4-24C-1 and 2 steel deck girder, concrete floor and wearing surface, Berrien Co., for State Hy. Dpt., Lansing.

Michigan—July 9, by R. A. Beers, resident engr., Kalamazoo, M. Br. 1 of 39-7-12 Contr. 1 and 2, Kalamazoo Co., steel deck girder, with rein.-con. floor wearing surface, 2 rein.-con. abutments, three 65 ft. spans, and two 6 ft. sidewalks, for State Hy. Comn., Lansing.

Miss., Belzoni — July 7, by Comrs. Main Separate Road Dist. 4, Humphries Co., 100 ft. creosoted timber bridge, 24 ft. wide, 69 ft. double and 69 ft. single concrete culverts, forty-eight 12- to 48-in. pipe endwalls. W. J. Price, Belzoni, engr.

Miss., Oxford—See "Streets and Roads."

Mo., St. Louis—July 15, by Bd. P. Serv., City Hall, 100 ft. pedestrian bridge, 10 ft. wide, continuous slab rein.-con. bridge to carry Grand Dr. over tracks, and bridge to carry Lindell and Union Blvds. over tracks, for City, Wabash R.R. Co., M. F. Longwill, ch. engr., Exchange Bldg. and Chicago, Rock Island & Pacific R.R. W. H. Petersen, ch. engr., La Salle St. Sta., Chicago, Ill., $145,470. L. R. Bowen, city engr.

New York and New Jersey—July 14, at office General Manager, Port Authority, 80-90 8th Ave., New York, constructing New York Approach to Hudson River Bridge from Fort

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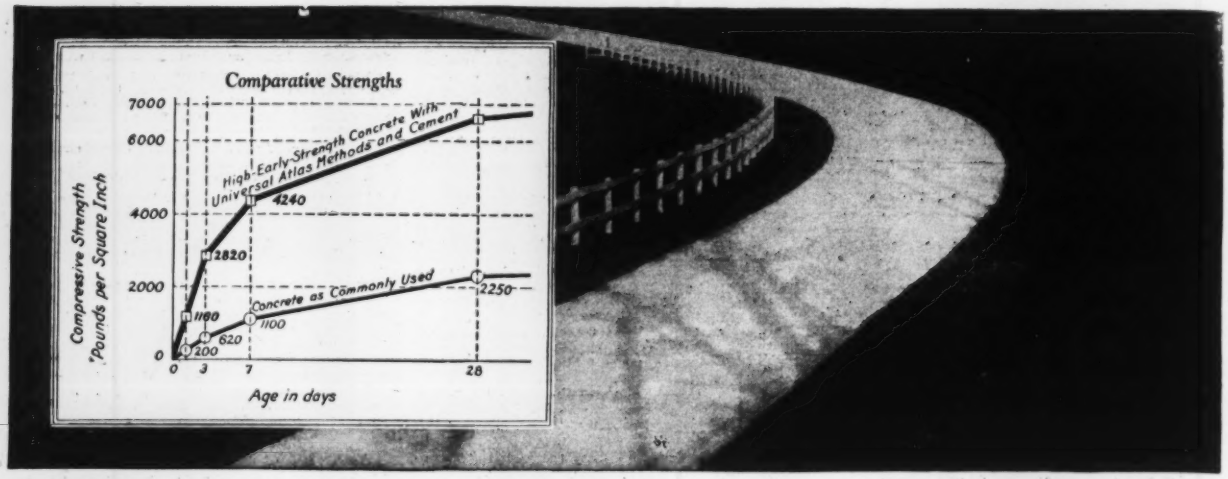

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Bridges (Continued)

Washington, New York, to Fort Lee, New Jersey, incl. main approach ramp, in Fort Washington Park, Contr. HRB-6, and vehicular tunnel in West 178th St., New York, Contr. HRB-8, New York; adv. E. N.-R. June 26.

Pa., Pittsburgh—July 1, by Comrs. Allegheny Co., Court House, electrical work, conduit, fixtures, other equipment for West End-North Side Bridge 3 over Ohio River. $16,500. V. R. Covell, 519 Smithfield St., engr. Noted Jan. 9.

Pa., Pittsburgh—July 1, by Comrs. Allegheny Co., Court House, removing existing bridge, reconstructing Bridge 3 and approaches over Bull Creek, Bull Creek Rd., Fawn Twp. $49,500. V. R. Covell, 519 Smithfield St., engr. Noted Mar. 27.

Tex., Pt. Isabel—Pt. Isabel Bridge Co., c/o H. H. Poshong, pres., taking bids 10,500 ft. heavy timber on piling causeway, having 2 draw bridges, one single span, 100 ft. long, other 50 ft. long from here to Padre Island. $1,000,000. Address owners. Noted June 12.

Virginia—July 8, by State Hy. Comn., Richmond, 4 steel beam span bridges in Sussex Co.; grading 0.6 mi. roads in Culpepper Co.; adv. E. N.-R. June 26.

CONTRACTS AWARDED

Arkansas—State Hy. Dpt., Little Rock, 11 bridges in Monroe Co. to L. H. Lacy Co., 2632 Swiss St., Dallas, Tex., $257,160—7 bridges, Monroe and St. Francis Counties, to Maxwell Constr. Co., Columbus, Kan., $41,612—bridge, Clay Co., to M. K. Orr, Little Rock, $27,521—2 bridges St. Francis Co., to Crow Creek Gravel & Sand Co., Forrest City, $27,885—bridge, Boone Co., to Interstate Constr. Co., Fort Smith, $68,501—6 bridges, Nevada and Clark Counties and bridge in Prairie and Monroe Counties, to Vincennes Bridge Co., Vincennes, Ind., $153,415 and $60,836 respectively. Grand total $636,930.

California — State Hy. Comn., Sacramento, timber bridge over Consumnes River, near El Dorado, El Dorado Co., to C. E. Force, Piedmont, $21,975—rein.-con. girder bridge over South Fork Yuba River, near Indian Springs, Nevada Co., to Alturas Constr. Co., Sacramento, $13,935—steel, concrete bridge over Salinas River, on Coast Hy. at Bradley, Monterey Co., to H. E. Doering, Yreka, $256,563. Grand total $292,293. Noted May 29.

California — State Hy. Comn., Sacramento, concrete, steel bridge over Salinas River, near Gonzales, Monterey Co., to Jacobs & Pattiani, 337 17th St., Los Angeles, $114,990. Noted May 22.

Calif., Santa Barbara — Santa Barbara Co., structural steel bridge with wood floors, concrete footing and abutments over San Roque Creek, on Goleta Foothill Blvd., to Merritt-Champan & Scott, San Pedro, painted $34,808; galvanized iron $38,853.

Ia., Dubuque—See "Streets and Roads."

Maryland—State Rds. Comn., Baltimore, extending double span concrete bridge, Contr. B-105-411, Baltimore Co., to A. C. Conaway, Savage, $7,272—substructure, concrete floor, approach span, and complete approaches for proposed grade elimination, over Baltimore & Ohio R.R., Contr. M-118-53, Montgomery Co., to T. D. Claiborne Co., Garrett Bldg., Baltimore, $103,164. Noted June 12.

Mississippi—See "Streets and Roads."

Miss., Grenada—Grenada Co., three concrete bridges on Hy. 51, north of here, to J. A. and H. E. Pigford, Russell, $42,184. Noted Jan. 16.

Missouri—State Hy. Comn., Jefferson City, to Kiefner & Geile, Perryville, bridge over D. D. 1, $9,975; over creek, $5,490, Scott Co.—to M. Haase, St. Joseph, over Unnamed Slough, Carroll Co., $6,170; over Sandy Branch, $4,556—to S. J. Cohen & Co., Blytheville, Ark., over St. Francis River, Wayne Co., $79,548; over Courtois Creek, $50,052; over branch, $3,122, Crawford Co.—to Koss Constr. Co., Des Moines, Ia., over creek, Jasper Co., $3,079—to R. G. Alridge, Kansas City, over Atchison, Topeka & Santa Fe R.R., Ray Co., $23,725—to Neyer Constr. Co., Bloodland, over Dry Branch, Lawrence Co., $2,116. Grand total $187,833. Noted May 22.

Missouri—State Hy. Comn., Jefferson City, to G. W. Condon Co., Grain Exch. Bldg., Omaha, Neb., bridges over St. Paul & Kansas City Short Line R.R., Caldwell Co., $10,352—to F. T. O'Dell, Hannibal, over Frene Creek, Gasconade Co., $14,654—to Garrett Constr. Co., Springfield, over branch of Cahoochie Creek, Dallas Co., $3,169—to Knutson Bros., Kansas City, over West Fork Big Creek, Harrison Co., $7,455—to R. H. Sharp, Reeds Springs, over Carlock Branch, Dade Co., $3,828—to J. Keal, Edwardsville, Ill., over drainage ditch, $14,542; over overflow, $6,226; over overflow, $9,603; over overflow, $11,924; over Lick Creek, $12,429; over overflow, $7,305; over Dredged Creek, $1,924; over drainage ditch, $7,910; over Dredged Creek, $7,787, all Stoddard Co.—to C. P. O'Reilly Constr. Co., St. Louis, over West Fork Black River, $42,323; over Hunter Hollow, $6,139; over Brooks Hollow, $5,858, all Reynolds Co.—to Skrainka Constr. Co., St. Louis, over Dawson Creek, $3,938; over Post Creek, $2,682; over Coldwater Creek, $14,726, all St. Louis Co.—to M. Wunderlich, St. Paul, Minn., over Keaster Hollow, $3,621; over Dry Valley, $10,590; over Ratcliffe Hollow, $2,548; over Pocahontas Hollow, $8,065, all Carter Co.; over fork Monroe River, $12,058; over Gier Branch, $3,888; over Blue Springs Branch, $17,703, Miller Co.—to Carlon Constr. Co., Maplewood, over west branch River Des Peres, $25,875; over Deer Creek, $31,183, retaining wall on R. 50, Sect. 83, $8,025, St. Louis Co.—to Republic Concrete Constr. Co., Republic, over Tabo Creek, $4,515; over Tabo Creek, $6,456; over Missem Creek, $4,441; over Dry Creek, $4,398, all Henry Co.—to Bunnell Mack, M. Korr, Paragould, Ark., over Little Ramsey Creek, $15,531; over Job's Creek, $9,915; over creek, $3,344, Cape Girardeau Co. Grand total $366,930. Noted May 29.

Mo., Kansas City—Jackson Co., constructing rein.-con. bridge and grading, paving Prospect Ave. Rd., to Drexel Constr. Co., 816 North 8th St., $26,812 and $8,212 respectively.

New Jersey—Joint Bridge Comn. Hudson Co. (Jersey City) Bergen Co. (Hackensack) and Essex Co. (Newark) Court House, Hackensack, redecking Belleville Bridge over Passaic River, at Belleville, North Arlington and Lyndhurst, to Linde & Griffith Co., 152 Passaic St., Newark, $22,750. Est. $25,000.

Oklahoma—State Hy. Dpt., Oklahoma City, 9 span 456 ft. steel truss bridge on concrete piers at Collinsville, Tulsa Co., and 3 span, 152 ft. steel truss bridge on concrete piers at Oologah, Rogers Co., to Boardman & Co., Maple and Hawk Sts., Oklahoma City, $102,998 and $43,658 respectively, est. $110,000 and $45,000 respectively—8 span 108 ft. rein.-con. bridge near Hopeton, Woods Co., to Nims & Frost, Hydro, $31,909 est. $35,000. Grand total $178,565. Noted May 29.

Pa., Banning — Pittsburgh & West Virginia R.R. Co., Wabash Bldg., substructure 1,500 ft. steel truss and girder bridge, 340 ft. wide, 109 ft. high over Youghiogheny River near Jacobs Creek, to Vang Constr. Co., Grant Bldg., Pittsburgh; superstructure, to American Bridge Co., Frick Bldg., Pittsburgh. Est. $300,000.

Pennsylvania—See "Streets and Roads."

Wash., Seattle—State Hy. Comn., S. J. Humes, dir., Aurora Avenue Bridge, to L. Coluccio & Co., 1638 Lane St., $335,809. Contractor sublet contract to D. Nygren, Lyon Bldg.

Wash., Seattle—S. J. Humes, dir. State Hys., approaches, piers for flanking spans Lake Union Bridge, King Co., to L. Coluccio & Co., 1638 Lane St., $335,809. Noted May 8.

STREETS AND ROADS

BIDS ASKED

California—July 9, by C. H. Purcell, engr. State Hy. Comn., Sacramento, oil treated, crushed gravel or stone surfacing 12.7 mi. Wilson Creek Rd., Del Norte Co.—grading, asphaltic concrete surfacing 5.8 mi. Bretona-Dunnigan Rd., Yolo Co.—bituminous macadam surfacing 12.6 mi. Castic School Rd., Los Angeles Co.—grading, concrete paving 2.6 mi. Arno-Cosumnes River Rd., Sacramento Co.

Calif., Los Angeles—July 2, by Bd. P. Wks., City Hall, sidewalks, storm drains, sanitary sewers, street lighting, asphaltic concrete paving, grading 12,560 cu.yd. Western Ave. $25,000.

Calif., Salinas — July 8, by Bd. Supervs. Monterey Co., improving San Miguel Canyon Rd., incl. 784 tons base rock, 448 tons 1 in. and 224 tons ½ in. rock, 178 bbl. 90-95 road oil; Mud Flat Rd., 2,446 tons base rock, 232 tons ½ in. rock, 140 bbl. 90-95 road oil. H. Cozzens, Salinas, co. surv.

Connecticut — July 7, by J. A. Macdonald, state hy. comr., Hartford, waterbound macadam paving 33,673 ft. hys. in Cornwall, Sharon, Eastford, New Milford, Winchester—bituminous macadam paving 2,644 ft. hy. Darien—trap rock waterbound macadam paving 20,048 ft. hy. South Windsor—concrete paving 76,745 ft. hys. in Lisbon, Manchester, Vernon, Middlebury, Woodbury, and New Canaan—construction 62 ft. steel I-beam overpass Meriden—widening 626 ft. existing concrete at West Haven—3 span, 215 ft. encased girder bridge East Haddam and Haddam—65 ft. triple box rein.-con. bridge East Hartford—30 ft. span encased girder bridge, and 1,327 ft. concrete, Kent; adv. E. N.-R. June 26.

Conn., Bristol — July 1, by City, c/o C. W. Buel, city engr. 175 Main St., curbing 2,300 ft. sidewalks, 6,000 ft. guttering and grading ½ mi. Rockwell Ave.

Ill., Chicago—June 30, by City, at office Bd. Local Impvts., City Hall, 11 to 16 ft. concrete sidewalks on East and West Adams, Cornell, North Carter, North Clark, West Division, South Wells North Franklin, North Halsted, North Harrison, West Lake, Noble, Rush, Sherman, Sedgwick, East 31st, East Van Buren, West Washington, Weed, Yeaton, West Lake, North Des Plaines, West 14th, East 92nd, South Clinton, North Dearborn, West 18th, West Erie, South Halsted, West Lincoln, South Jefferson, West Madison, Orleans, West Randolph, West Superior, North Wells Sts., Blue Island, North Chicago, South 5th, West Grand, Canalport, Commercial, South Chicago, Claybourn, Cottage Grove, West North and South Union Aves. M. J. Faherty, pres.

Ind., Bloomington—July 8, by Bd. Comrs. Monroe Co., crushed stone surfacing 7,375 ft. Burch Rd., $12,968; 11,615 ft. M. Christwood Rd., $19,000. A. Eller, Bloomington, aud.

Ind., Edgewood—June 28, by City, B. Shippy, clk., concrete paving, $28,786.

Ind., Evansville — July 2, by Bd. Comrs. Vanderburgh Co., macadam surfacing Mill and Christ Rds. $27,788. S. D. Bell, Evansville, co. aud.

Ind., Evansville—July 7, by Bd. Comrs. Vanderburg Co., asphaltic concrete surfacing Covert Avenue Rd. $48,880. S. B. Bell, Evansville, co. aud.

Ind., Terre Haute—July 2, by Bd. Comrs. Virgo Co., concrete surfacing 1 mi. Frank Beck Rd., $25,619; 3 mi. D. M. Robinson Rd., $98,162. C. C. Pinson, Terre Haute, co. aud.

Ind., Winamac — July 8, by Bd. Comrs. Pulaski Co., stone surfacing 2 mi. F. M. Connor Rd., $11,828—11,700 ft. E. Mayhaugh Rd., $15,003—12,400 ft. Freeman-Spurgeon Rd., $14,140. R. E. Wilson, Winamac, co. aud.

Kansas—July 1, by State Hy. Comn., at Sublette, grading, culverts 12.047 mi. K46, F. A. P. 421-A, Haskell Co.—8.634 mi. K45, F. A. P. 423-A, Stevens Co.—sand graveling 24 mi. K45, F. A. P. 416-A, Gray Co. W. V. Buck, hy. comr.

Kan., Wichita—June 30, by C. C. Ellis, city clk., curbing, guttering, grading, asphaltic concrete paving 16,412 sq.yd., concrete paving 21,370 sq.yd., and brick paving 1,274 sq.yd. Bway., Kansas, Minneapolis, Murdock, Orme, Poplar, Palisades, St. Francis, 13th, Waterman and Yale Sts. P. L. Brockway, City Hall, engr.

Louisiana—July 1, by State Hy. Comn., Baton Rouge, surfacing, bridge, Livonia-Opelousas Rd., Point Coupee and St. Landry Parishes; culverts on Lottie-Livonia Rd., Pointe Coupee Parish. H. B. Henderlite, hy. engr.

Louisiana — July 8, by State Hy. Comn., Baton Rouge, grading, drainage structures on 8 mi. Project 190-K, Route 11, Carroll Parish—12.1 mi. Project 602-A, Route 127, and 4.4 mi. Project 753-A, Route 289, East Feliciana Parish.

Maryland—July 1, by State Roads Comn., Baltimore, penetration macadam paving 1.96 mi. Contr. W-77-62, Washington Co.—2.1 mi. Contr. P-123-32, Prince George's Co.—penetration macadam resurfacing 3.18 mi. Contr. H-84-42, Harford Co.—alternate on hot and cold bituminous mixtures resurfacing 4.87 mi. Contr. C1-86-511, Carroll Co.—concrete paving 1.25 mi. Contr. Ce-89-22, Cecil Co.—gravel surfacing 1.5 mi. Contr. Gh-91-84, Charles Co.—concrete shoulders on 0.94 mi. Contr. M-153-311, Montgomery Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.

Md., Baltimore — July 2, by Bd. Awards, sheet asphalt paving 13,900 sq.yd. streets listed in Contr. 557. N. L. Smith, Municipal Office Bldg., hys. engr.

Md., Towson — July 1, by Baltimore Co. Comn., Court House, concrete paving 1.16 mi. roads in Group 6. S. A. Green, Court House, roads engr.

Massachusetts—July 1, by Dpt. P. Wks., Boston, improving Boston-Worcester Turnpike, Sect. A, rein.-con. paving 11,715 ft. hy. Shrewsbury, and also timber trestle bridge, steel stringers—Sect. B, rein.-con. paving 28,447 ft. hy. and 2 rein.-con. steel stringer bridges, rein.-con. beam and steel stringer bridges, Shrewsbury, Northboro and Westboro—Sect. C, rein.-con. paving 23,860 ft. hy., and constructing 2 steel stringer bridges, with concrete floors, Westboro and Southboro. A. W. Dean, Boston, engr.

Massachusetts — July 1, by Dpt. P. Wks., Boston, gravel and bituminous macadam paving 15,300 ft. hy. Ayer — bituminous macadam paving 2,880 ft. Easthampton—2,750 ft. Danvers—11,075 ft. hy. Chicopee and Springfield. A. W. Dean, Dpt. P. Wks., Boston, engr.

Massachusetts — Dpt. P. Wks., Boston, rescinded contract bituminous macadam paving 2,719 ft. hy. in Great Barrington. Will readvertise. Noted May 22 under "Contracts Awarded."

Mass., Boston — June 30, by Dpt. P. Wks., Boston, sheet asphalt or bitulithic paving Liverpool St., Ward 1, $25,000; Albany St. Ward 8, $30,000. J. A. Rourke, comr. Dpt. P. Wks.

Mich., Detroit—June 28, by Dpt. P. Wks., stone curbing, 3½ in. sheet asphalt on 8 in. concrete paving 57,706 sq.yd. Livernois Ave. P. A. Fellows, City Hall, engr.

Miss., Hazlehurst—July 1, by City Council, curbing, concrete surfacing 5,800 sq.yd. Culley-O'Brien Eng. Co., Jackson, engrs.

Miss., Oxford — July 8, by Bd. Supervs. Lafayette Co., grading, culverts, bridges 3.442 mi. Oxford-Sardis Hy.

Miss., Yazoo City—July 2, by D. M. Love, mayor, and City Council, grading, curbing, guttering, sewers, concrete, brick, Topeka, Warrenite, asphaltic concrete and lime rock asphalt paving 90,355 sq.yd., streets, driveways and alleys. McGowen & Williams, Yazoo City, consult. engrs.

Miss., Yazoo City—July 7, by Bd. Supervs. Yazoo Co., grading, bridging, graveling roads in Dist. 3. J. B. Williams, Yazoo City, engr.

New Jersey—July 14, by State Hy. Comn., Trenton, 9 in. rein.-con. paving 0.45 mi. Route S-25, Burlington-Bristol Bridge Approach, Burlington Co. A. L. Grover, ch. engr.; adv. E. N.-R. June 26.

N. J., Maplewood (br. South Orange) — June 28, by Twp. Com., Township Hall, curbing, guttering, repaving Tuscan Rd. and Boyden Ave. $50,000. H. Heilman, 9 Highland Ave., twp. engr.

New York—July 9, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, grading, paving access drives on Hutchinson River Parkway, at North, Webster and Mamaroneck Aves., Weaver St., in New Rochelle, White Plains, Scarsdale, and Harrison. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. June 26.

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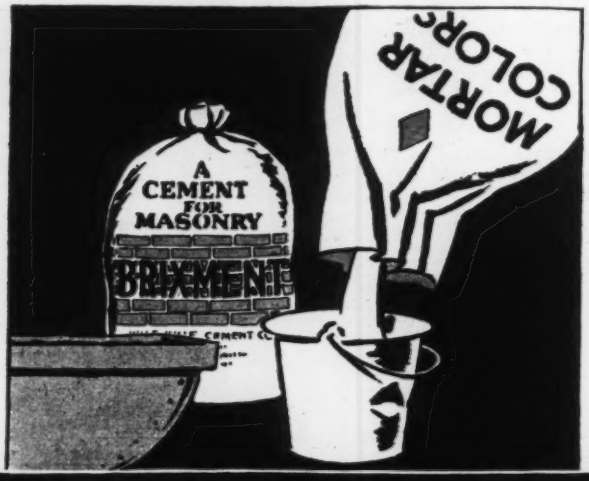

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BRIXMENT

Streets and Roads (Continued)

N. Y., Beacon — June 30, by City Council, 525 Main St., rein.-con. paving 2.8 mi. Verplanck and Wolcott Aves., Mill, East Main and Spring Valley Sts. R. A. Nerrie, comr. Accounts; adv. E. N.-R. June 26.

N. Y., Mount Pleasant — July 8, at office Westchester Co. Park Comn., 72 West Plainfield Rd., Bronxville, grading, bituminous macadam (penetration method) paving 7,000 sq.yd. driveways at State Police Barracks. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. June 26.

N. Y., Newark — July 16, at office Dpt. Mental Hygiene, State Office Bldg., Albany, gutters, etc. at Newark State School. F. W. Parsons, comr.; adv. E. N.-R. June 26.

N. Y., New York—June 30, by J. Miller, pres. Manhattan Boro, Municipal Bldg., grading, curbing, sidewalks, granite block, on concrete paving 6th Ave., Church, Laight and Walker Sts.—grading, sheet asphalt on concrete paving Park Ave. from north rail track in 86th St. to north building line 96th St., except granite block paving 10 in. strip next to rail at 86th Sts.

N. Y., New York—July 2, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, curbing, flagging, bituminous macadam paving West Ave.—grading, 3 in. asphalt block on concrete paving 4th, 49th and 60th Sts.—grading, recurbing, reflagging, asphalt paving Colonial Rd., Avenue P—asphalt on 6 in. concrete paving Cropsey, Miller, and Kingsland Aves., North 1st, South 4th Sts.—curbing, flagging Avenue L, Ashford, East 45th, East 56th, Remsen, 4th Sts.—grading Belmont, Flatlands, Remsen Aves., Ashford, East 45th, East 56th, Hendrix Sts.—grading, curbing flagging Georgia Ave.

N. Y., St. George—July 2, by J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete paving Amboy Rd.; grading, concrete paving Richmond Ave.

N. Y., Yonkers—July 8, by C. MacDonald, engr. Westchester Co., Court House, White Plains, curbing, sidewalks, rein.-con. paving 0.44 mi. Yonkers Ave., Co. Rd. 66-2; adv. E. N.-R. June 26.

O., Akron—June 30, by F. E. Swineford, dir. P. Serv., grading, concrete paving 2,700 ft. Airport Service Rd., 18 ft., $30,000; setting back curb, widening, vitr. brick paving 6 ft. strip on each side of present paving, installing white way lighting on 3,800 ft. South High St., $65,000. E. A. Kemmler, Municipal Bldg., engr.

O., Cincinnati—July 3, by Comrs. Hamilton Co., asphalt bound macadam retreading 38,000 sq.yd. Sheed Rd. from I. C. H. 42 to Blue Rock Rd. $29,640. E. A. Gast, Court House, co. engr.

O., Cleveland—June 27, by City, paving Valley Rd. S. W., from Elston Ave. S. W., to Jennings Rd. S. W.—Euclid Ave. from East Blvd. N. E. to Ford Dr. N. E.—Superior Ave. N. E. from East 117th St. to East 120th Sts.—Upton Ave. N. E. from East 149th to East 152nd Sts.—Vandalia Ave. S. W. from West 58th St. to city limits—East 94th St. from Kinsman Rd. S. E., to southerly end—East 140th St. from Idarose Ave. N. E. to Glenside Ave. N. E. $100,000. R. Hoffman, city engr.

O., East Liverpool—Bd. Control, bids about Aug. 1, paving Walnut St., asphalt $34,000, brick on slag base $33,000, 8 in. concrete $41,700. F. Clapsaddle, city engr.

O., Jefferson—June 30, by Ashtabula Co. Comn., W. W. Howes, clk., grading, draining 5 mi. Sects. O. P. Q, Lenox-Dorset Rd., 28 ft. $27,000.

Okla., Woodward—July 1, by H. M. Renner, city mgr., grading, concrete paving 6,600 sq.yd. 9th St. $25,000. Black & Veatch, Mutual Bldg., Kansas City, Mo., engrs.

Pa., Phila.—July 1, by Bureau Hys., Dpt. P. Wks., City Hall, A. Murdock, dir., Schedule A, grading—Schedule B, redressed granite block repaving Front and 24th Sts.—Schedule C, asphalt resurfacing, heater method, Group 18—Schedule D, fabricated structural steel for east truss of City Avenue Bridge 3, over Schuylkill River.

Pa., Waynesburg—June 30, by K. W. Scott, boro secy., grading, curbing, brick paving 1,360 ft. East Lincoln St., 30 ft. G. D. Jenkins, boro engr.

S. D., Tyndall—July 7, by City, alternate types paving 6 blocks, $25,000. W. E. Buell & Co., 318 Insurance Exch., Sioux City, Ia., engrs.

Tex., Amarillo—Taking bids alternate types paving. $70,000. E. N. Stanley, Amarillo, engr.

Tex., Corpus Christi—July 3, by E. C. Cocke, engr. Nueces Co., grading, drainage, surfacing 60 mi. lateral roads main hys. through county, 18 ft. $240,000.

Tex., Memphis—July 7, by Comrs. Hall Co., c/o A. C. Hoffman, Judge, grading, bridging concrete paving 0.714 mi. county road, 26 ft. $45,000. Hasie Eng. Co., Inc., Memphis, engrs.

Utah—July 2, by State Rd. Comn., Salt Lake City, grading, graveling 10,000 cu.yd. Lincoln Hy. in Parleys Canyon from Lamb Canyon to Summit, Salt Lake Co. H. S. Kerr, Salt Lake City, st. engr.

Virginia—July 1, by State Hy. Dpt., Richmond, macadam surfacing 1.1 mi. Route 39, Project F-641-D, Augusta Co.—2.4 mi. Route 54, Project S-643-A, Clark Co.—grading 1-2 mi. Route 26, Project S-598, Grayson Co.—repairing bridges, Route 30, Project S-554-B, King William Co.

Virginia—See "Bridges."

Washington—July 8, at office S. J. Humes, dir. Hys., Olympia, crushed stone, bituminous treated surfacing 38 mi. State Rd. 3 between Chewelah and Kettle Falls Park, Stevens and Ferry Counties.

Wash., Seattle—Bd. P. Wks. bids about July 9, grading, sewers, sidewalks, street lighting, paving Madison and East Madison Sts. from 5th to 12th Aves. $34,678. W. D. Barkhuff, city engr.

W. Va., Wellsburg—July 2, by A. Montgomery, clk. Brooke Co., Court House, preparing road for cold patch, furnishing, rolling into place cold patch per ton on Meehling Hill Rd.—cold patch and retread surfacing 3,964 ft. Cross Creek Rd.—retread surfacing 4,000 ft. Windy Hill Rd.—6,000 ft. Bealls Ridge Rd.—concrete surfacing 513 ft. Eldersville Rd.—1,683 ft. May Hill Rd.—concrete shoulders, concrete box culvert, Bethany Pike Rd.

Wisconsin—July 1, by State and Oconto and Door Counties Hy. Comns., Nicolet Bldg., Green Bay, grading, paving 7.465 mi Green Bay-Oconto-Marinette Rd., U. S. Hy. 41, F. A. P. 5 and S. P. 3183—24.4 mi. Institute-Sister Bay Rd., S. T. Hy. 78, S. A. P. 3346—8.249 mi. Lakewood-North County Line Rd., S. T. H. 32, F. A. P. 339.

Wisconsin—July 2, by State and Waupaca and Portage Counties Hy. Comns., Wisconsin Rapids, grading, surfacing 6.91 mi. Stevens Point-Ellis Rd., S. P. 4602; and constructing Symco Bridge, S. P. 4593.

Ont., Hamilton—See "Contracts Awarded."

CONTRACTS AWARDED

Ala., Birmingham—City Comn., to Morgan-Hill Paving Co., Woodward Bldg., 2 in. asphalt on 6 in. concrete paving 7 blocks 6th Ave. S., $21,226 est. $50,300: widening street 6 ft. and 2 in. asphalt on 6 in. concrete paving 2 blocks South 20th St., $14,627 est. $32,000; 1 block South 20th St., $4,591 est. $10,500; constructing 4 ft. sidewalks 5 blocks Highland Ave., $2,419 est. $5,850; widening street 10 ft., 5 blocks 6th Ave. S. from 27th to 32nd Sts. $8,341 est. $11,500—to Independent Paving Co., 3828 1st Ave. S., grading 4 ft. concrete sidewalks 1 block 18th St. N., $2,632, est. $4,250, all foregoing 40 ft. wide—to Fromhold Bros., American Traders Bldg., 2 in. asphalt on 6 in. concrete paving 300 ft. 41st Pl. and 46th Ave., N., $5,570 est. $8,600—to Mitchell Bros., 3828 1st Ave. S., 1 block 17th Ave. and 18th Pl., $3,383 est. $5,500—to Dunn Constr. Co., Lincoln Life Bldg., 2 blocks Delta St., $6,308 est. $9,950—to M. B. Grenough, American Traders Bldg., portion 13th Ave. S., $4,055 est. $6,800, all foregoing 30 ft. wide; 1 block 55th St., Ensley, 40 ft., $4,627 est. $7,075. Grand total $77,779.

Ala., Birmingham — Bd. Revenue Jefferson Co., 7 in. concrete paving 2 mi. Rutledge Springs to Brighton, 18 ft., to Jefferson County, Courthouse, by convict labor. $25,000.

Arkansas—State Hy. Comn., Little Rock, concrete paving 6.75 mi. road in Randolph Co. and 1.5 mi. Pipe Co., to Phoenix Constr. Co., Fort Smith, $102,557 and $40,363 respectively—3.5 mi. and 4 mi. Franklin Co., to Shultz Constr. Co., Paris, $68,992 and $79,913 respectively—3 mi. Clark Co., to J. P. McNulty, Pine Bluff, $42,348—crushed stone paving 12 mi. Johnson Co., to Lybrand & Robertson, Sheridan, $33,084—grading, graveling 2 mi. Cross Co., to Newell Constr. Co., Little Rock, $25,208—grading 6 mi. Ouchita Co., to O. M. New, Conway, $45,438—2 mi. Brodley Co., to Wimberly Constr. Co., Arcadia, La., $37,769—4.5 mi. White Co., to Altman-Rodgers Co., Cotton Grain Exch. Bldg., Oklahoma City, Okla., $81,726—1.5 mi. grading, deck girder bridge, Marion Co., to Yellville Constr. Co., Yellville, $49,067—17 mi. Newton and Seary Counties, to Lyle & McWilliam, Mena, $23,498. Grand total $629,963.

Ark., Osceola—Gravel surfacing 50,000 cu.yd. Mississippi County Ave., to Morgan Eng. Co., Goodwyn Inst. Bldg., Memphis, Tenn., $66,665.

California — State Hy. Comn., Sacramento, untreated crushed gravel or stone on crusher run surfacing 10.8 mi. Nevada and Placer Counties, to Hemstreet & Bell, 501 11th St., Marysville, $157,089—17.9 mi. Shasta and Lassen Counties, to Mathews Constr. Co., Forum Bldg., Sacramento, $278,251—grading, asphaltic concrete paving 1 mi. Los Angeles Co., to Griffith Co., Los Angeles Ry. Bldg., Los Angeles, $36,320—bituminous macadam surfacing 4.4 mi. Marin Co., and grading 1.8 mi. Butte Co., to Granfield, Farrar & Carlin, Hoff Ave., San Francisco, $94,892 and $248,528 respectively. Grand total $815,080. Noted May 22.

Calif., Los Angeles—Los Angeles Co., Cash Contr. 394, improving 6.12 mi. Maun St., to Kovacevich & Price, 1553 Loma Ave., Long Beach, $293,105.

Calif., Los Angeles — Bd. P. Wks., grading, culverts, 8 in. asphaltic concrete paving 325,000 sq.ft. Gaffey St., to Griffith Co., 502 Los Angeles Ry. Bldg., Los Angeles, $84,137. Est. $110,317. Noted May 15.

Calif., Manhattan Beach—Grading, 4 in. macadam paving 107,000 sq.ft. East R.R. Dr., et al., to E. T. Brown, Petroleum Securities Bldg., Los Angeles, $26,968. Noted May 29.

Calif., Salinas—Monterey Co., grading, culverts, rock surfacing Salinas—Watsonville Rd., to Granite Constr. Co., Watsonville, $257,552.

Calif., Salinas — Monterey Co., improving Pacific Grove-Carmel Rd., to J. L. Conner, Monterey, $39,636.

Calif., San Mateo—Widening, curbing, grading, paving B St., to Stewart & McGaw, San Mateo, $50,670 — grading, curbing, guttering, paving 17th and 19th Aves. et al., and grading, curbing, guttering, asphaltic concrete on waterbound rock macadam paving 9th and 16th Aves., et al., to Union Paving Co., Call Bldg., San Francisco, $84,821 and $90,582 respectively. Grand total $226,073.

Conn., West Hartford (br. Hartford)—City, asphalt on concrete and sheet asphalt paving 18,538 sq.yd., to Edward Balf Co., 7 Haynes St., Hartford, $72,041. Est. $70,000.

Florida—At office State Rd. Dpt., Tallahassee, broken stone base surfacing 29.43 mi. Project 500-B and C, Project 515, Bay and Jackson Counties, to Marianna Product Co., Marianna, $297,675—constructing approaches to bridge over Calocsahatchee River at Punta Gorda and Florida rock surfacing 10 mi. hy. Tamiami trail north of Naples, to F. D. Beasley Co., Inc., Tampa, $24,535 and $20,291 respectively—12 mi. hy. between Trenton and Newberry, to L. M. Gray, Gainesville, $99,943—bridges in Bay Co., to J. U. Fletcher, Panama City, $683; to Florida Bridge & Constr. Co., Orlando, $4,056; and to R. J. Arrington & Son, De Funiak Springs, $360—bridges in Palm Beach Co., to Central Florida Constr. Co., Green Cove Springs, $7,991—asphalt for State Road 33, Walton Co., to Mexican Petroleum Co., Rhodes-Haverty Bldg., Atlanta, Ga., $667—tar for same road, to Barrett Co., Fairfield, $864; slag, to Woodstock Slag Co., 2201 1st Ave. N., Birmingham, Ala., $2,375—oil and asphalt for Ocala-Williston Rd., Marion Co., to Texas Co., Jacksonville, $4,035. Grand total $463,475. For furnishing 1,173 tons material to be used on Ocala-Williston Rd., Marion Co., also rock, to Florida Crushed Stone Co., Tampa. Noted May 22.

Ill., Evanston—Bd. Local Imprvts., City Hall, and Comrs. Cook Co., grading, curbing, guttering, concrete paving 24,700 sq.yd., brick paving 400 sq.yd., macadam paving 300 sq.yd. West Railroad Ave., to M. Foley Co., Evanston, $86,650. Noted May 29.

Ind., Salem—Washington Co., stone paving 14,048 ft. W. J. Norris Rd., to Jean & Naugle, Pekin, $13,475—Pekin-Palmyra and Fredericksburg-Mt. Carmel Rds., to Kile Kilman, Pekin, $53,040. Est. $79,592. Noted May 22.

Ind., South Bend—St. Josephs Co., gravel surfacing 4 mi. Pierce Rd., to Carvey, Tombaugh & Carvey, Macy, $59,890. Est. $78,300. Noted May 22.

Ind., South Bend — St. Joseph Co., concrete surfacing Juniper Rd., to Willston Constr. Co., South Bend, $54,500. Est. $76,450. Noted May 22.

Ia., Dubuque—Dubuque Co., grading 10.89 mi. trunk roads, to J. P. Hurley, Bankston, $27,484; bridges, to J. B. Elliott, Independence, $11,480.

Ia., Nevada — Story Co., graveling 38,000 cu.yd. Ontario-Slater Rd., to Nelson & Mclohn, Nevada, $33,992. Rejected bids grading, shaping, channel change 8.5 mi. local roads. S. Steigerwalt, Court House, engr.

Kansas—State Hy. Comn., Topeka, to Geiger & Rutherford, Leavenworth, grading, culverts 4.978 mi. F. A. P. 414-A, Linn Co., $27,898—to Independent Constr. Co., Pittsburg, concrete paving 2.73 mi. F. A. P. 213-B, Paola Co., $64,928, 8.243 mi. Sect. C, same road, $188,668, 1.932 mi. Sect. D, same road, $42,458; 1.558 mi. Sect. F, same road, $35,126. Grand total $359,078.

Maryland—State Hy. Comn., G. C. Uhl, chn., Baltimore, concrete paving 1.09 mi. Contr. B-141-411, Baltimore Co., to P. Reddington Son, 2 East Lexington St., Baltimore, $49,176. Noted June 5.

Maryland — State Road Comn., Baltimore, concrete paving 2.6 mi. Contr. AA-27-72, Federal Aid Project 214, Anne Arundel Co., to Caton Contg. Co., Halethorpe, $46,835; 2 mi. Contr. G-40-62, Garrett Co., to Cumberland Contg. Co., Cumberland, $46,890. Noted May 15.

Maryland—State Rds. Comn., Baltimore, concrete paving 0.52 mi. Contr. Co-85-24 Cecil Co., to P. D. Phillips & Bro., Salisbury, $15,500; graveling 1 mi. Contr. Sm-62-84, St. Mary's Co., to H. W. Hewitt & Sons, Valley Lee, $6,474. Noted Apr. 24 and May 22 respectively.

Maryland — State Roads Comn., Baltimore, concrete paving 1.2 mi. Queen Anne Co., to Field, Barker & Underwood, Inc., Commercial Bldg., Phila., Pa., $28,933—sheet asphalt paving 1.2 mi. Baltimore Co., to National Paving & Contr. Co., Menlo Dr., and W. M. R.R., Baltimore, $146,286—concrete shoulders 1.07 mi. Baltimore Co., to D. Marine, 236 Albermarle St., Baltimore, $7,895—4.87 mi. Carroll Co., to Thomas, Bennett & Hunter, Westminster, $33,098—concrete patches in existing surfaces 0.3 mi. Cecil Co., to G. & L. Contg. Co., Maple Ave., Overlea, Baltimore, $1,485. Grand total $217,697. Noted June 12.

Md., Baltimore—Bd. Awards, sheet asphalt paving 29,850 sq.yd. Contr. 556, to P. Flanigan & Sons, Harford Rd. and Baltimore & Ohio R.R., $73,251; concrete paving 8,850 sq.yd. Contr. 554, to Arundel Contg. Co., 910 Trinity St., $19,356. Noted June 5.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 2,719 ft. hy., Great Barrington, to A. G. Bianchi, 98 Lincoln Park, Longmeadow, $15,318—gravel and bitulithic surfacing 1,420 ft. Marshfield, to D. Gregoria Bros., 5 Seward St., Worcester, $20,438 — 10,850 ft. Framingham, to Klauer Bros., 345 Franklin St., Cambridge, $13,686 — rein.-con. and bituminous macadam paving 1,930 ft. Hudson, to W. J. Sullivan, 50 Dartmouth St., Somerville, $24,547. Grand total $82,989. Noted June 12.

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Streets and Roads (Continued)

Mass., Boston—Dpt. P. Wks., granite block paving Mass. Ave., Wards 7 and 8, to S. J. Tomasello, 41 Arborway, Jamaica Plain, $53,693. Noted May 29.

Mass., Pittsfield — Rein.-con. paving Francis Ave., Seymour, Linden and West Sts., to Richmond Foundation Co., Pittsfield, $79,125; Appleton Ave., East Housatonic and Reed Sts., to C. B. Lindholm, Pittsfield, $66,593. Est. $150,000.

Minnesota—State Hy. Comn., St. Paul, (**S.P. means State Project**), grading, incl. portable, monolithic culverts, 21.6 mi. S.P. 4-45, 650,000 cu.yd. excav., to A. Guthrie & Co., Builders Exch. Bldg., St. Paul, $252,061—6.2 mi. S.P. 18-23, Sect. 2, 155,100 cu.yd. excav., to W. W. Magee, 3rd and Market Sts., St. Paul, $60,199—8.6 mi. S.P. 36-21, Sect. 1, 330,500 cu.yd. excav., to G. J. Grant Constr. Co., Como Blvd. and Northern Pacific Tracks, St. Paul, $79,057—9.8 mi. S.P. 36-21 ,Sect. 2, 330,100 cu.yd. excav., to W. N. Petria, Champlin, $93,688—12.5 mi. S.P. 65-22 426,700 cu.yd. excav., to Nelson, Mullen & Nelson, 355 Gateway Bank Bldg., Minneapolis, $133,373. Grand total $628,378. Noted June 4.

Mississippi—State Hy. Dpt., Jackson, grading, conditioning 8.1 mi. Liberty-Barwick Rd., to T. Carey, 4310 Elba St., New Orleans, La., $82,000.

Miss., Hazelhurst—Grading, curbing, guttering, sewers, watermains, 2 in. asphaltic concrete on 5 in. concrete paving 8,950 sq.yd. Projects 14, 16 and 17, to Cobb Bros. Constr. Co., Meridian, $24,985. Noted May 29.

Missouri—State Hy. Comn., Jefferson City, (**R. means Route**), to Republic Concrete Constr. Co., Republic, grading 3.095 mi. Henry Co. $23,381 — to Bunnell & Mack and M. Korr, Paragould, Ark., 2.242 mi. R.74, Sect. 1, Cape Girardeau Co. $16,868; 2.242 mi. Sect. 2 same road $20,836—to F. T. O'Dell, Hannibal, gravel-ing 3.317 mi. R.19, Sect 81, Gasconade Co. $56,678; 3.377 mi. Sect. 82, $39,080; 3.34 mi. Sect. 83 $42,243 — to R. H. Sharp, Reeds Springs, 4.282 mi. Dade Co. $14,984—to A. L. Cook, Ottawa, 4.186 mi. R.71, Sect. 5 $31,987; 1.35 mi. R.18, Sect. 6A $8,936, both Nodaway Co.—to M. E .Gillioz, Monett, 2.857 mi. R.60, Sect. 61 A $6,462; 2.447 mi. Sect. 62 A $5,423, both Carter Co.—to Graham Bros., Leeds, 3.323 mi. R.71, Sect. 4 A $4,155; 4.305 mi. R.18, Sect. 5 $4,446, both Nodaway Co.—to M. Wunderlich, St. Paul, Minn., 3.479 mi. R.60, Sect. 63, Carter Co. $81,899; 0.886 mi. Sect. 64 A same road $25,708; 2.381 mi. Morgan Co. $20,143; 2.993 mi. R.52, Sect. 45, $32,926; 2.608 mi. R.54, Sect. 61 $130,521, both Miller Co.—to C. P. O'Reilly Constr. Co., Wainwright Bldg., St. Louis, 1.749 mi. R.21, Sect. 22 Reynolds Co. $38,590; 0.645 mi. Sect. 28 same road $11,832—to Samples & Elsea, Kirksville, 2.543 mi. R.24, Sect. 42, Monroe Co. $23,703; 2.613 mi. Sect. 43, same road $30,028—to C. N. Lund, 815 A Chestnut St., St. Louis, grading 3.708 mi. R.66, Sect 176 C $27,921; concrete paving same road $38,830; grading 4.209 mi. Sect. 176 D $38,189; concrete paving same road $42,885; grading 2.975 mi. Sect. 176 E $11,216; concrete paving same road $30,718, all Phelps Co.—to Joseph Kesl & Sons, Edwardsville, Ill., grading 0.75 mi. R.25, Sect. 35 $10,491; concrete paving same road $13,947; grading 0.254 mi. R.60, Sect. 83 A $22,632; concrete paving same road $4,932; grading 3.482 mi. Sect. 86 $42,737; concrete paving same road $51,826; grading 4.205 mi. Sect. 87 $38,445; concrete paving same road $66,004, all Stoddard Co.; grading 0.402 mi. Sect. 82 B, Butler Co. $22,120; concrete paving same road $7,725—to M. N. Penny, Lawrence, Kan., grading 3.03 mi. R.1, Sect. 8A $8,087; concrete paving same road $19,455; grading 3.427 mi. Sect. 9 A $8,017; concrete paving same road $19,545, all Atchison Co.; grading 3.315 mi. Sect. 10 A $9,571; concrete paving same road $18,903; grading 3.199 mi. Sect. 11 A, $12,913; concrete paving same road $20,247, all Holt Co.—to Garrett Constr. Co., Springfield, grading 3.078 mi. R.65, Sect. 307 G $23,442; concrete paving same road $37,564; grading 3.512 mi. Sect. 307 H $35,578; concrete paving same road $42,850; grading 3.67 mi. Sect. 307 I $30,371; concrete paving same road $44,780, all Dallas Co.; grading 3.037 mi. Sect. 45 A $36,438; concrete paving same road $37,061; grading 3.372 mi. Sect. 45 B $23,236; concrete paving same road $41,158 grading 4.555 mi. Sect. 322 C $55,584; concrete paving same road $33,443; grading 2.689 mi. Sect. 322 D $19,389; concrete paving same road $32,815, all Hickory Co.—to A. A. Davis Co., Cotton-Grain Exch. Bldg., Oklahoma City, Okla., grading 2.898 mi. R.50, Sect. 325 A $6,677; concrete paving same road $49,819; grading 2.87 mi. Sect. 325 B $54,654; concrete paving same road $47,582; grading 2.878 mi. Sect. 325 C $6,012; concrete paving same road $47,323, all Osage Co.—to George W. Condon Co., Grain Exch. Bldg., Omaha, Neb., grading 0.112 mi. R.36, Sect. 16, Caldwell Co. $1,077; concrete paving same road $1,328—to Skrainka Constr. Co., Security Bldg., St. Louis, grading 2.472 mi. R.61, Sect. 81, St. Louis Co. $30,395; concrete paving same road $62,315; alternate 1 using trap rock or granite aggregate on same road $31,645—to Carlon Constr. Co., Maplewood, grading 2.435 mi. R.50, Sect. 82 $28,326; concrete paving same road $43,918; alternate 1, on same road $33,585; grading 2.079 mi. Sect. 83 $25,191; concrete paving same road $34,456, all St. Louis Co.—to E. C. Johnson Constr. Co., Carrollton, crushed stone or gravel surfacing 3.181 mi. Clinton Co. $14,705—to Knutson Bros., Kansas City, 3.84 mi. Harrison Co. $17,870. Grand total $2,318,772. Rejected bids June 3, grading, crushed stone, gravel surfacing projects in Miller, Boone Lafayette, Marion and Ralls Counties. Noted May 29.

Mo., St. Louis—Bd. P. Serv., City Hall, asphalt paving Blair Ave., to Central Paving & Constr. Co., 411 North 7th St., $69,186 — Clemons Ave., to Trinidad Asphalt Mfg. Co., 600 South Theresa Ave., $13,553—Carroll St., to C. A. Moreno Co., Syndicate Trlust Bldg., $13,121—Missouri Ave., to Asphalt Paving Co. of St. Louis, 1328 Sublette Ave., $32,757—asphaltic concrete paving Switzer Ave., to Bridges Asphalt Paving Co., 1411 Central Industrial St., $15,865—warrenite bitulithic paving Compton Ave., to Granite Bituminous Paving Co., Railway Exch. Bldg., $27,092—vibrolithic concrete paving Hornsby Ave., to A. Maguire, Title Guarantee Bldg., $14,229 — Chippewa St., to Keal-Longergan Co., 4829 Easton Ave., $30,182. Grand total $215,985. Noted May 8.

Mo., St. Louis—Bd. P. Serv., City Hall, vibrolithic paving 5,710 sq.yd. and 5,130 sq.yd. Sarah St., to J. F. McMahon Contg. Co., Buder Bldg., $23,288 and $22,914 respectively—4,820 sq.yd. Sarah St., to Alfred Lewald, Inc., 6025 West Cabanne Ave., $19,739—re-cut granite block paving 10,975 sq.yd. Clark Ave. to Eyerman Contg. Co., 1210 South Grand Blvd., $92,905—warrenite bitulithic paving 19,325 sq.yd. Oakland Ave., to Granite Bituminous Paving Co., Railway Exch. Bldg., $79,806—grading, concrete paving alleys in City Blocks 3741, 2587, 2933 and 5862, to Skrain Constr. Co., Security Bldg., $16,724—City Block 1557, to W. Watters, 2611 South Kingshighway, $3,380—City Blocks 2844 and 3816WA, to Creech Constr. Co., 5619 Natural Bridge, $4,279—City Block 4239A, to W. A. Riley Constr. Co., 110 North 7th St., $2,368 —City Block 5429B, to Chase Constr. Co., 5230 Devonshire St., $1,390—City Block 5925, to Eyerman Contg. Co., 1210 South Grand Blvd., $5,052. Grand total, $271,845. Noted May 22.

Neb., York—York Co., 1¼ in. graveling 10 mi. Projects 1 and 7, to Allied Contractors, Inc., Nebraska Natl. Bank Bldg., Omaha, $15,837—15.5 mi. Projects 3, 4 and 5, to A. C. Lund, Kearney, $19,847—11 mi. Projects 2, 6 and 8, to Central Bridge & Constr. Co., Wahoo, $19,050—100 tons structural steel and 40 tons reinforcing steel, to Western Bridge & Constr. Co., 3867 Leavenworth Ave., Omaha, at $53.20 and $57.20 per ton respectively. Noted May 29 Daily.

Nevada—State Hy. Dpt., S. C. Durkee, engr., Carson City, gravel, gravel surfacing, 31.44 mi. hy. from Elko to Deeth, Route 1, Sects. B and C, 24 ft. and 18 ft. to Nevada Rock & Sand Co., Reno, $134,533. Est. $166,000. Noted June 5.

New Hampshire—State Hy. Dpt., Concord, 6 in. one course, rein.-con. on 8 in. gravel surfacing 52,667 sq.yd. Dartmouth College Rd., Grantham, to B. Perini & Sons, Inc., Ashland, Mass., $163,013. Est. $200,000.

N. J., Bogota—Bd. Boro Council, Administration Bldg., curbing, rein.-con. paving Dunn and Fisher Aves., to Purdy & Hamilton Constr. Co., Inc., 16 West Fort Lee Rd., $29,955.

N. J., Hackensack—Bergen Co., Court House, grading, concrete paving State Hy. Route 1, Alpine and Englewood, and Crescent Ave., Allendale and Ramsey, to G. M. Brewster & Son, 253 West Fort Lee Rd., Bogota, $139,606 and $38,415 respectively—East Glenn Ave., Ridgewood, to G. F. Brackett, Clifton, $68,954. Grand total $246,975.

N. J., Hackensack—Bd. Freeholders Bergen Co., grading, concrete paving Orangeburg Rd. and Terrace Ave., to J. P. Burns, Park Ave., Dumont, $31,235 and $48,978 respectively.

N. J., Jersey City—Bd. Freeholders Hudson Co., Court House, grading, curbing, widening, paving Passaic, Palisade, County, Schuyler Aves., Belleville and Newark Turnpikes, to Lettiere-Bellezza Co., 921 Bergen Ave., $33,428.

N. J., Ocean City—Bd. City Comrs., City Hall, grading, concrete paving Wesley Ave., to Wallace & Gilbert, Ocean City, $21,115.

N. Y., Little Falls—Curbing, concrete paving Southern Ave. and Bellinger St., to Koetteritz & Blakeslee, Little Falls, $39,310.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to Brooklyn Borough Asphalt Co., 1301 Metropolitan Ave., Brooklyn, asphalt paving 49th St., $2,618; 46th St. $10,757—to Cleveland Trinidad Paving Co., Flushing, 84th St., $7,673; 88th Ave. $8,251; 38th St. $5,205; 18th Pl. $12,036—to Highway Impvt. & Repair Co., Furmans Island, Brooklyn, Himrod St., $80,289—to W. P. McDonald, 7 Lawrence St., Flushing, 32nd Ave., $4,144—to Slattery Contg. Co., 7202 51st St., sidewalks on 69th St., $2,877; grading 95th St. $6,662—to Palmo Constr. Co., 47th Ave., $4,253—to O. B. Junior Contg. Co., 8625 137th St., Jamaica, grading 124th St., $11,753—Nelson Ave., $11,356—to P. K. Kelly Contg. Co., 6009 Woodside Ave., Woodside, 95th St., $904. Grand total $168,868. Noted June 5.

N. Y., Rome—Warrenite bitulithic paving 5 streets, to Warren Bros. Roads Co., Rand Bldg., Buffalo, $57,810.

N. D., Fargo—Concrete paving Oak Grove area, 1st St., parts of N and S Terraces, to S. Birch & Son Co., A.O.U.W. Bldg., $66,771.

Okla., Tulsa—City Comn., grading, curbing, guttering, 7 in. concrete paving 12,864 sq.yd. Impvt. Dist. 1043, to Standard Paving Co., 2611 East 11th St., $39,139. Est. $39,653. Noted May 22.

Oregon—State Hy. Comn., Salem, surfacing 13.9 mi. Roosevelt Coast Hy., Lincoln Co., to Hefty & Johnson, Portland, $146,541—5.2 mi. John Day Hy., Umatilla Co., to Baurs & Baurs, Dayton, Wash., $76,250—8 mi. Burns Hy., Grant Co., to C. R. Johnson, Portland, $68,682. Grand total $291,473.

Ore., Portland — Comrs. Multnomah Co., Court House, cement paving 3 mi. Canyon Rd., to J. L. Young, Portland, $181,423.

Pa., Dubois—Curbing, 9 in. concrete paving 3,145 sq.yd. Brady St.; bituminous repaving 5,700 sq.yd. West DuBois St., to W. C. Quick, Brookville, $32,695.

Pa., Phila.—Dpt. P. Wks., Bureau Hys., A. Murdock, dir., City Hall Annex, to Eastern Asphalt Co., Penna Bldg., asphalt paving Robbins St. $16,529; Sanger St. $1,875—to Union Paving Co., Board of Trade Bldg., 35th St. $2,907; asphalt repaving Dauphin St., $27,174; redressed granite block repaving 7th St. (track area) $7,119; asphalt resurfacing by heater method groups 1 to 9 (inclusive) $148,255—to Bailey & Sons Corp., 1528 Walnut St., furnishing c.i. bases for street designation signs, $1,335. Grand total $205,194.

Pennsylvania—State Hy. Comn., Harrisburg, grading, rein-con. surfacing 4.502 sq.yd. Somerset Co. and 39,666 sq.yd. Washington Co., to Harrison Constr. Co., Pittsburgh, $15,393 and $263,059 respectively—48,200 ft. Washington Co., to Donora Constr. Co., Donora, $471,406—9,700 sq.yd. Northumberland Co., to Atlas Paving & Draining Co., Atlas, $57,321—5,600 sq.yd. Westmoreland Co., to Wadsworth & Hays, Scottdale, $49,405—23,600 sq.yd. Susquehanna Co., to G. D'Angelo, Binghampton, $135,595—55,282 sq.yd. Route 140, and 22,970 sq.yd. Route 617, Dauphin Co. to Keystone Constr. Co., Harrisburg, $210,924 and $69,064 respectively—grading, bituminous surface treated macadam surfacing 7,232 sq.yd. Snyder Co., to Smith, Fenster-macher Co., Allentown, $65,697—84,868 sq.yd. Lycoming Co., to Lane Constr. Co., 134 State St., Meriden, Conn., $133,656—60,528 sq.yd. Lebanon and Lancaster Counties, to I. J. Reighter Constr. Co., Harrisburg, $169,740—4,751 sq.yd. Clinton Co., to Jersey Shore Constr. Co., Jersey Shore, $15,750—9,434 sq.yd. Montour Co., to T. B. Evans, Danville $32,337—7,103 sq.yd. Mifflin Co., to J. C. Shawfield Co., Harrisburg, $29,683—also 110 ft. single span truss bridge with 23 ft. roadway, Tioga Co., to Central Penna Constr. Co., St. Marys, $33,532. Grand total $1,752,676. Noted June 5.

Pa., West View—Improving Lakewood Ave., rein.-con. flooring on Martsolf and Ridgewood Ave. Bridge, also concrete pipe culvert at Perrysville Rd .and West View Park, to Ross Constr. Co., 161 Perryville Ave., Pittsburgh, $63,987.

Tennessee—State Dpt. Hys. & P. Wks., Nashville, concrete paving 0.721 mi. hy. in Anderson Co. and 4.176 mi. Hamilton Co., to Murray Constr. Co., Holston Natl. Bank Bldg., Knoxville, $19,489 and $83,336 respectively—11.02 mi. Madison Co., to Bover & Johnson, Henderson, $217,011—rock asphalt on concrete surfacing 6.696 mi. Lawrence Co., to Municipal Paving & Constr. Co., Nashville, $170,088—13.042 mi. Hickman Co., to W. F. Bowe, Jr., Augusta, Ga., $344,033—grading 2.501 mi. Jackson Co., incl. timber bridge over 20 ft. span, to Marion Constr. Co., Lebanon, $102,020—18.042 mi. Tipton Co., to Dicus Bros., Waynesboro, N. C., $111,503—6.109 mi. Shelby Co., to W. R. Aldrich & Co., Dyersburg, $148,475—8.205 mi. Harden and Wayne Counties, to Steele Co., Albertsville, Ala., $59,523—5 steel, timber bridges over 20 ft. span in Tipton Co., to C. E. Snyder & Co., Ripley, $35,230—1 concrete, steel bridge over 20 ft. span, Hardin and Wayne Counties, to E. Hardy & Sons, Pulaski, $38,528. Grand total $1,329,236. Noted June 12.

Vermont—State Hy. Dpt., Montpelier, rein.-con. paving 3.9 mi. hy. Ludlow and Cavendish, to C. Bianchi & Son, Framingham, Mass., $138,294. Est. $140,000. Noted June 17.

Washington—S. J. Humes, dir. State Hys., Olympia, grading, crushed stone surfacing 0.974 mi. State Rd. 3, Rosalia North and Rosalia South Rds. Whitman Co., to R. M. Gumaer, 207 Carssow Bldg., Lewiston, Idaho, $40,604.

W. Va., Holidays Cove—Bd. Control, concrete surfacing 8 streets, to W. H. Armstrong Co., Fairmont, $34,000. Est. $35,000. Noted June 5.

Wisconsin — State and Waukesha Co. Hy. Comns., 513 Commerce Bldg., Milwaukee, concrete paving 6.575 mi. Milwaukee-Pewaukee Rd., to Marchese Bros., 435 Clinton St., Milwaukee, $120,159. Noted June 5.

Wis., Milwaukee—Dpt. P. Wks., to Bodeman-Constr. Co., grading, paving alleys between South 18th and 19th Sts., $1,499; between North 75th and North 76th Sts., $7,190; between North 54th Blvd. and North 55th Sts., $19,069; between North 23rd and North 24th Sts., $1,606; between North 20th and 21st Sts., $7,928—to N. Harris, 6309 Girod Ave., alley between North 3rd and North 4th Sts., $382; West Morgan Ave. $1,342—to Parkinson Constr. Co., 322 27th St., alley between North 21st and 22nd Sts., $3,895; West Over Ave., $817—to Czerwinski Constr. Co., 816 Clinton St., North 58th St., $33,061—to Gumz & Switalski, 831 13th Ave., West Nash St., $4,342; West Fairview Ave. $3,634 — to Schwerm Bros., 1703 Weil St., North 40th St., $9,054—to White Constr. Co., 68 East Wisconsin Ave., East Mason St., $3,515—to F. Hunt, 445 Milwaukee St., South Howell Ave., $24,729; West Fowler St., $14,002. Grand total $136,065.

Wis., Milwaukee—Milwaukee Co. improving Grand Park and Greenfield Park Drs., to F. M. Gagliano, 741 Jackson St., $24,221 and $7,060 respectively.

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Streets and Roads (Continued)

Wis., Milwaukee — Bd. Supervs, Milwaukee Co., paving Menomonee River Dr., to J. D. Bonness, 1460 Green Bay Ave., $69,578—Hampton Rd. 3, to Froemming Bros., 1326 Humboldt Ave., $46,839—Oklahoma Ave, "A," to Lex Constr. Co., 446 68th Ave., West Allis, $70,140—Port Washington Rds., 3 and 4, also Burnham St. to Badger Constr. Co., 97 East Wisconsin Ave., $98,500 and $17,547 respectively. Grand total $302,604.

Ont., Chalk River—C. H. Fullerton, deputy minister Dpt. Northern Development, Parliament Bldgs., Toronto, clearing, grading 10 mi. diversion Pembroke-Mattawa Rd., to Muskoka Constr. Co. Ltd., Huntsville. Est. $50,000-$60,000. Noted May 27 Daily.

Ont., Cornwall — Cornwall Twp., concrete paving 1.5 mi., to F. Stidwell, Cornwall. Est. $25,000.

Ont., Forest Hill — Village, asphalt paving 26,000 sq.yd., to Constructing & Paving Co. Ltd., Confederation Life Bldg., Toronto. Est. $125,000.

Ont., Hamilton—Asphalt on concrete paving Birch Ave., McNab and Walnut Sts., day labor under supervision W. L. McFaul, city engr. $114,155.

Ont., Kitchener—City Council concrete paving, to J. Schultz, 64 Cedar Grove Ave., at $2.50 per sq.yd.; asphalt paving, to Standard Paving Co. Ltd., Central Chambers, Ottawa, at $2.70 per sq.yd. Est. $50,000.

Ont., Ottawa—Ottawa Suburban Roads Comn., widening, asphalt paving Richmond Rd. from Driveway to Westboro, surfacing 1 mi. North Gower-Richmond Rd., to Grant Bros. Constr. Co. Ltd., Ottawa, $14,000 and $12,000 respectively; 1¼ mi. Cyrville Rd., to Diblee Constr. Co. Ltd., Ottawa.

Ont., Toronto—City Council, asphalt paving Ellis and Windermere Aves., to Godson Contg. Co. Ltd., 203 Richmond St. W., $11,322—bitulithic on concrete paving Keewatin and Wanless Aves., to Asphaltic Concrete Co. Ltd., Sun Life Bldg., $24,031.

Ont., Toronto—East York Twp., bituminous macadam paving Dilworth Crescent, Springdale Blvd., Chesolm, Monarch, Park, Mortimer, Woodmount, Woodington Aves., to Gordon Crushed Stone Co. Ltd., Confederation Life Bldg. Est. $50,000.

Ont., Trenton—P. J. O'Rourke, town clk., asphaltic concrete paving 20,000 sq.yd., to Standard Paving Co. Ltd., Central Chambers, Ottawa. Est. $75,000. Noted May 15.

Excavation, Drainage, Irrigation, Levees, River and Harbor

PROPOSED WORK

Ala., Montgomery — City, W. A. Gunter, mayor, and Bd. Revenue, Montgomery Co. Bd. Revenue, draining section in West Montgomery, incl. open ditch, culverts, 117,467 cu.yd. excav., 28 acres clearing, grubbing. $50,000-$60,000. J. M. Garrett, Montgomery, engr.

Tex., Corsicana—F. N. Drane, floating pumping plant, to irrigate 2,000 acres land, 20 mi. south of here. Koch & Fowler, Central Bank Bldg., Dallas, and Corsicana, engrs.

Tex., Pt. Isabel — Brownsville Navigation Dist., c/o J. Gregg, Merchants Natl. Bank Bldg., Brownsville, navigation project, near here, incl. 25 ft. channel 300 ft. wide through Brazos Santiago Pass, 25 ft. channel, 100 ft. wide from pass through Bay to west side of Long Island; 2 channels, 100 ft. bottom, 24 ft. deep, from Long Island to Pt. Isabel and Brownsville, with turning basins, equipment for port. $4,783,000. Address District. Noted June 12.

Ont., Burlington—Town 125,000 cu.yd. fill behind revetment wall. $35,000. G. H. Power, Burlington, engr.

BIDS ASKED

Ind., Rochester—July 2, by Bd. Comrs. Fulton Co., constructing John Head Ditch, incl. 2,058 ft. 18 in. clay tile. $25,000. W. W. Wilson, Rochester, engr.

Ind., Washington — July 1, by Bd. Comrs. Daviess Co., James Hardy Ditch, incl. 974,978 cu.yd. dry earth excav. $92,643. E. C. Faith, Washington, engr.

Ind., Valparaiso—July 2, by Bd. Comrs. Porter Co., constructing G. H. Grieger Drainage Ditch, incl. 190,865 cu.yd. excav., $25,000. F. Cornish, Valparaiso, engr.

Ia., Eldora—July 3, at office Auditor Hardin Co., improving Hy. D. D. 138, incl. 4,482 ft. 6- to 12-in. tile.

Mass., Boston — June 27, by Dpt. P. Wks., J. A. Rourke, comr., dredging at refuse receiving station, Fort Hill Wharf, city proper.

O., Akron—July 14, by H. G. Sours, aud. Summit Co., constructing Wolf Creek Drainage 32, incl. Proposal 1, dredging 551,000 cu.yd.; Proposal 2, constructing storm sewers, lowering sewers, water lines; adv. E. N.-R. June 26.

Pa., Pittsburgh—July 1, by R. G. Woodside, controller Allegheny Co., Court House, Pittsburgh, excavation new channel for Chartiers Creek, embankment eliminating Bridges 19 and 22, 1 rein.-con. culvert at Bridge 22, in Heidelberg Boro, Scott and Collier Twps. $214,000. N. F. Brown, 519 Smithfield St., engr.

Tex., Edinburg — July 12, by Hidalgo Co. Water & Impvt. Dist. 6, Edinburg, A. L. Cramer, pres., Engleman Gardens, irrigation improvements, incl. furnishing, laying 221,500 sq.ft. concrete canal lining, incl. all earth work. $160,000. Address District.

Tex., Harlingen—July 10, by Cameron Co. Water Impvt. Dist. 15, c/o S. F. Ewing, Rio Grande Natl. Life Co. Bldg., installing concrete pipe lines, meters, pumps, near Rio Hondo, A. Tamm, 209½ West Jackson St., engr.

Tex., Port Arthur—July 1, by City Comm., and J. B. Converse & Co., engrs., Port Arthur, Tex., and Mobile, Ala., and W. O. Bowers, city engr., installing 1,500 tons steel sheet piling in 1,723 ft. wall, 30 ft. high, also concrete anchor wall, appurtenances. Noted May 8.

B. C., Vancouver—July 3, by N. Desjardines, secy. Dpt. P. Wks., Ottawa, Ont., dredging, $26,000.

N. S., Little Anse—July 2, by N. Desjardines, secy. Dpt. P. Wks., Ottawa, Ont., reconstructing breakwater, Richmond Co. $200,000.

Ont., Billings Bridge—July 7, by C. H. Guest, clk. Gloucester Twp., Alexander Municipal Drain, incl. 45,301 cu.yd. earth excav., 1,190 cu.yd. hardpan, 1,581 cu.yd. rock, 425 cu.yd. concrete, culverts, $34,000. Patterson & Byrne, 71½ Sparks St., Ottawa, engrs.

Ont., Southampton—July 10, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, revetment wall, timber crib, Saugeen River. $35,000.

CONTRACTS AWARDED

Ala., Birmingham—A. J. Hawkins, city engr., straightening, widening, deepening 1 mi. (1st sect.) Village Creek, 70 ft. wide, 9 ft. deep, 79,600 cu.yd. earth and 36,400 cu.yd. rock excav., 500 sq.yd. concrete work, to Sutton Bros., Nashville, Tenn., $95,400. Est. $174,020. Noted May 8.

Calif., Placerville—R. W. Browne, secy. El Dorado Irrigation Dist., 685 Main St., Webber Creek Diversion Dam, part of Webber Creek Storage Project, El Dorado Co., incl. diversion tunnel, waterways, appurtenances, concrete work, to R. W. Littlefield & American Eng. Co., 337 17th St., Oakland, $293,900. Noted June 4.

Ga., Augusta—Augusta Levee Comn., c/o T. S. Gray, chn., repairing, reinforcing, rebuilding, enlarging Butler St. gate structure of Augusta Levee, to C. Y. Thomason, Greenwood, S. C., $27,700. Est. $27,000. Noted Apr. 10.

Louisiana — Bd. State Engineers, 207 New Orleans Court Bldg., New Orleans, 50,000 cu.yd. drainage of borrow pits in Pontchartain Levee Dist., to W. Cambre, St. Gabriel, at $0.25 per cu.yd.; 85,000 cu.yd. drainage of borrow pits and 35,000 cu.yd. restoring wave wash in Atchafalava and Lafourche Basin Levee Dists., to L. P. Davis, Gretna, at $0.26. Noted May 22.

Mass., Marblehead — Town, Bd. Selectmen, rock and earth excav., Shepard St., etc., to J. Cudihy & Son, 25 Chestnut St. Est. $25,000.

N. S., Sheet Harbor—Dpt. P. Wks., Ottawa, Ont., dredging, to Halifax Dredging Co. Ltd., Halifax, $36,855.

Ont., Cobourg—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to Natl. Sand & Material Co. Ltd., Harbour Comn. Bldg., Toronto, $16,641. Noted May 22 Daily.

Ont., Kincardine—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to W. L. Forrest, Goderich. Est. $35,000. Noted May 14 Daily.

Ont., Port Burwell—Dpt. P. Wks., Ottawa, timber crib, concrete base for proposed lighthouse at outer end rubble mound breakwater, other certain additional quantities placed in checkwater and breakwater, to Port Arthur Constr. Co., Port Arthur, $25,265.

Ont., Sault Ste. Marie—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to C. S. Boone, Dredging & Constr. Co. Ltd., Excelsior Bldg., Toronto, $123,300. Noted May 22 Daily.

Ont., Toronto—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to Natl. Sand & Material Co. Ltd., Harbour Comn. Bldg., $20,160. Noted May 23 Daily.

Quebec—Dpt. P. Wks., Ottawa, Ont., dredging Miramicki River, to Miramicki Dredging Co., Newcastle, N. B., $23,975.

Quebec—N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., dredging Yamaska River, to Natl. Dock & Dredging Co. Ltd., Quebec, $22,726. Noted May 14 Daily.

Quebec—N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., dredging Valleyfield, to Les Chantiers Monseau, Ltd., Sorel, $46,400; Baie Lavelliers, to A. Lapeniere, Pierreville, $28,700; Nicolet, to National Dock & Dredging Corp. Ltd., Quebec, $9,262. Grand total $84,362. Noted May 22.

Que., Doucet Landing—Dpt. P. Wks., Ottawa, Ont., dredging, to Natl. Dock & Dredging Co. Ltd., Quebec, $42,000.

Public Bond Elections

Coming Bond Elections

Waterworks — Indianola, Miss., June 20, $200,000.
Waterworks Impvts. — Helena, Mont., July 7, $200,000.
High School—Belleville, Ill., July 12, $150,000.
School — St. Louis Park, Minn., June 23, $250,000.
Auditorium—Knoxville, Tenn., August, $300,000.

Bonds Voted

Waterworks—Livingston, Ala., $35,000.
Sewage Disposal Plant—Rome, N. Y., $300,000.
Airport—Sacramento, Calif., F. J. Klause, City Engr., $150,000.
School—Visalia, Calif., $210,000.

Bonds Defeated

Waterworks—Sacramento, Calif., $450,000.
Bridge—Mobile County, Ala., $1,100,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ala., Mobile — DREDGING — U. S. Eng., 6,000,000 yd. in Mobile Harbor.

Fla., Cedar Keys—DREDGING—U. S. Eng., Jacksonville, 15,300 yd. in Cedar Keys Harbor.

Ill., Chicago—BREAKWATER—U. S. Eng., 2nd Dist., rebuilding 1,336 lin.ft. south wing-inner breakwater, in Chicago Harbor.

Wyo., Sheridan—GARAGES—U. S. Vet. Bu., 30 garages, at Fort McKenzie.

BIDS ASKED

Ala., Maxwell Field (mail Montgomery) — SCHOOL — July 29, by Con. Q. M., air corps tactical school building at Maxwell Field; adv. E. N.-R. June 26.

California—ROAD—July 8, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 5.14 mi. Placerville-Lake Tahoe Hy., Route 32, Sect. C, El Dorado Co.

Conn., Newington—DISPOSAL PLANT—July 15, by Vet. Bu., disposal plant, at U. S. Veterans Hospital.

D. C., Wash.—APPROACH WORK—June 30, by Treas. Dpt., at office Sup. Archt., new approach work to administration building.

D. C., Wash. — EQUIPMENT — July 15, by Treas. Dpt. at office Sup. Archt., repairing mechanical equipment in U. S. Veterans Hospital.

Idaho, Boise—DEEP WELL—July 15, by Vet. Bu., one deep well at U. S. Veterans Hospital.

Ill., Fort Sheriden—STEEL FRAME BUILDINGS—July 1, by Con. Q.M., furnishing, erecting 2 steel frame buildings.

Ill., North Chicago—QUARTERS—July 29, by Vet. Bu., officers quarters, C. T. building, altering dining hall, roads, walks, grading and drainage at U. S. Vet. Hospital.

Michigan—DREDGING—July 8, by U. S. Eng., Detroit, dredging Rouge River and hire of dredging plant to be operated in Black River, Port Huron; adv. E. N.-R. June 26.

Miss., Vicksburg—IRON CASTINGS—July 7, by U. S. Eng., P. O. Box 667, 126,000 lb. iron castings.

Mo., St. Louis—STORES—July 9, by Treas. Dpt. at office Sup. Archt., installing new boilers in Appraisers Stores.

Nevada—ROAD—July 1, by Dpt. Agriculture, San Francisco, Calif., grading, surfacing part Topaz Forest Hy., Douglas Co.

N. Y., Oswego—DREDGING—July 1, by U. S. Eng., 267,000 cu.yd. material overlying ledge rock in Oswego Harbor; adv. E. N.-R. June 26. Noted June 19.

N. Y., St. George—BELL BUOY BODIES—July 8, by Superintendent Lighthouses, 67 acetylene, whistling and bell buoys, with skeleton steel lantern towers, some with bells and some with whistles.

N. D., Fargo—GARAGE and STOREHOUSE—July 15, by Vet. Bu., garage and storehouse, at U. S. Vet. Hospital.

O., Wright Field—LABORATORY—July 12, by Con. Q.M., radio laboratory, maintenance building, foundry, garage, wood shop extension, wind tunnel, armament laboratory, oil house.

Tex., Randolph Field—DRAINAGE, etc.—Con. Q. M. taking bids 35,000 ft. 8- to 30-in. drainage pipe; 36,400 ft. non-climbing fence, around airdomes.

Tex., San Antonio—QUARTERS, etc.—July 15, by Con. Q. M., bachelor officers quarters and mess buildings, quartermaster maintenance building, fire station, eighty-five 2 story officers quarters, utilities and appurtenances at Randolph Field; adv. E. N.-R. June 27. Noted Feb. 27 and May 22.

Wyoming—ROAD—July 2, by Pub. Rds., Denver, Colo. grading 6.137 mi. Jackson Park-Wind River Natl. Forest Hy., Teton Natl. Forest Park, Teton Co.

Alaska—ROAD—July 16, by M. D. Williams, dist. engr., Juneau, constructing 2.95 mi. Wards Cove-Mud Bay, Tongass Natl. Forest Rd., Juneau.

CONTRACTS AWARDED

Ark., Helena—DITCH—U. S. Eng., drainage ditch in White River Levee Dist., 4 mi. below here, to H. B. Blanks, Tallulah. $2,400.

Ark., St. Helena—REVETMENT STONE—Third Field Area Mississippi River Comn., 25,000 cu.yd. revetment stone for use in 3rd field area, to W. A. Cammack, Home Insurance Bldg., Little Rock.

Arizona—ROADS—C. H. Sweetser, c/o Office Park Supt. Grand Canyon, grading 17.57 mi. Sect. D Grand Canyon-Old Trails Natl. Forest Hy., Coconino Co., to H. Galbraith, Jerome, Idaho. $66,494. Noted May 8.

Calif., San Diego—STOREHOUSE, etc.—Spec. 6174—Yards & Docks, Navy Dpt., extending paint and oil storehouse at Naval Operating Base, to H. Muns, 649 Spreckles Bldg., $3,689; paving, drainage system, to A. Johnson Co., 517 El Centro St., South Pasadena, $1,178; fire protection, to R. V. Morris Co., San Diego, $7,384. Grand total $12,251.

D. C., Wash. — FOUNDATION — D. Lynn, archt. Capitol, foundations for office building House of Representatives, Square, to C. H. Tompkins Co., 1608 K St., $158,500. Noted May 1.

D. C., Wash.—TENDER and MACHINERY—Bureau Lighthouses, tender "Linden," to Merrill Stevens Dry Dock & Repair Co., 612 East Bay St., Jacksonville, Fla., $129,000. Noted Mar. 27.

Florida—JETTIES—U. S. Eng., Jacksonville, repairing north and south jetties, to R. G. Lassister & Co., Jacksonville, $182,030. Noted May 22.

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Federal Government (Continued)

La., Carville—SILOS—Treas. Dpt. at office Sup. Archt., 2 silos for U. S. Marine Hospital, to LeBlanc-Barbay Co., St. Gabriel, $4,300.

Mich., Benton Harbor—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office, to C. Barnes, Logansport, $89,000. Noted May 8.

Mich., Detroit—ADDITIONS—Treas. Dpt. at office Sup. Archt., addition and changes to Light Keepers House, Marine Hospital, to J. Seven Co., Grosse Point, $8,680. Noted May 8.

Mich., Muskegon — BREAKWATER — U. S. Eng., Milwaukee, Wis., north rubble mound breakwater and shore connections, to T. L. Durocher Co., Detroit, $1,062,450. Noted Apr. 24.

Nev., Hawthorne — TELEPHONE SYSTEM, etc.—Specs. 6143 and 6138—Yards & Docks, Navy Dpt., automatic telephone system at Naval Ammunition Depot, to B. L. Perry, Inc., 222 Douglas Bldg., Los Angeles, Calif., $10,632 (90 days); screens and window shades, to Pacific Door & Sash Co., 660 Lexington Ave., Los Angeles, Calif., $7,500 (75 days), and to Elkeles, Inc., 1200 West 8th St., Los Angeles, Calif., $1,110. Grand total $19,242.

N. J., Passaic—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 electric elevators, to Atlas Elevator Co., 298 Market St., Newark. Noted Apr. 24.

N. M., Fort Stanton—SILOS and BRIDGE—Treas. Dpt. at office Sup. Archt., 2 new silos and bridge, at U. S. Marine Hospital, to Ramey Bros., El Paso, Tex., $4,000 and $3,750 respectively. Noted May 15.

N. M., Santa Fe—COURT HOUSE—Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Court House, to G. Griffith Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $46,000. Noted May 1.

New York—DREDGING—U. S. Eng., New York, dredging, rock removal in Hudson River, to Dunbar & Sullivan Dredging Co., 2312 Buhl Bldg., Detroit, Mich., $197,985. Noted May 22.

N. Y., Mineola — ROADS — Con. Q. M., Mitchel Field, New York, roads in barrack area, to Gifford Constr. Co., 161-10 Jamaica Ave., Jamaica, $5,175.

N. Y., New York—ALTERING—Treas. Dpt. at office Sup. Archt., altering transportation driveway, to C. W. Anderson, 135 West 53rd St., $10,470.

O., Chillicothe—ELECTRICAL WORK—Dpt. Justice, electrical work for penitentiary, to G. Worthington Co., 802 St. Clair Ave. N. W., Cleveland, $4,797.

Pa., Phila. — REROOFING — Spec. 6188—Yards & Docks, Navy Dpt., reroofing Buildings M1, M2, M3, Marine Quartermaster Depot, to B. Foster, Co., 20th St. and Erie Aves., $12,098 (90 days).

Tenn., Memphis—STEEL FABRIC—U. S. Eng. 60,000 pieces reinforcing steel fabric to National Steel Fabric Co., Union Trust Bldg., Pittsburgh, Pa., f.o.b. cars Monessen, Pa., at $1.39 cwt. or total $83,400, cost transporting mill to New Madrid, Mo. $8,224, cost transfering from cars to government barges $1,500, making total cost at New Madrid, Mo. $93,124. Noted May 15.

Wyo., Sheridan—ROADS—Vet. Bu., resurfacing roads around U. S. Veterans Hospital, to B. Dean, Sheridan, $58,100. Noted May 8.

RAILWAYS

BIDS ASKED

Minnesota and Wisconsin — See "Contracts Awarded."

Missouri — Resident Engineer, Illinois Terminal R.R. System, 313 Shell Bldg., St. Louis, bids about July 16, concrete trestle work in connection with elevated line; also soon takes bids subway under 12th St. from point south of Cass Ave. to proposed underground terminal, at Lucas Ave., 11th, 12th and Morgan Sts., in St. Louis.

CONTRACTS AWARDED

Minnesota and Wisconsin — Minnesota, St. Paul & Saulte Ste. Marie R.R. Co., E. A. Whitman, ch. engr., Soo Line Bldg., Minneapolis, Minn., track replacement, bridge filling from Superior, Wis., to Moose Lake, Minn., own forces, $200,000.

Missouri — Illinois Terminal R.R. System, Shell Bldg., St. Louis, fabrication 7,500 tons structural steel for elevated line to connect with surface line on 12th St. near Howard St., St. Louis, to McClintock-Marshall Co., 1416 1st Natl. Bank Bldg., Chicago, Ill.; erecting steel, to Ben Hur Erection Co., 5100 Farlin Ave., St. Louis; substructure for piers, to G. Locke Tarlton Co., 411 North 7th St., St. Louis; river pier, temporary freight house and office building, 12th St. between Wash and Carr Sts., St. Louis, to Fruin-Colnon Contg. Co., Merchants-Laclede Bldg., St. Louis. Est. $1,500,000.

Texas and Oklahoma—Atchison, Topeka & Santa Fe Ry., W. W. Kelly, ch. engr. western lines, Amarillo, Tex., roadbed construction, bridging, etc., for 125 mi. standard gage railroad line between Amarillo, Tex., and Boise City, Okla., to Sharpe & Fellows, Central Bldg., Los Angeles, Calif., $700,000; laying tracks, by own forces.

SUBWAYS AND TUNNELS

BIDS ASKED

New York and New Jersey—See "Bridges."

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GRADE CROSSINGS

PROPOSED WORK

Tex., Childress—City, steel, concrete underpass under Fort Worth & Denver City Ry. $42,000. S. D. Bacon, Childress, engr.

Ont., Toronto — Canadian Natl. Ry., New Union Sta., T. T. Irving, ch. engr., and York Twp., Margison & Babcock, engrs., McLean Bldg., rein.-con., steel overhead crossing on Eglinton Ave. $60,000.

CONTRACTS AWARDED

N. Y., Ridgway — New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, reconstructing bridge carrying Medina-Albion State Hy. over tracks, to W. J. Gallagher, Medina, $66,474.

Ont., Toronto — Dpt. P. Wks., Parliament Bldgs., 800 ft. rein.-con. overhead crossing, incl. heavy earth grading, fill, over Canadian Northern Ry., on Kingston Rd., Scarborough Twp., to Johnson Bros., Box 248, Brantford. Est. $150,000.

O., Dayton—Dayton Union Ry. Co., Union Sta., J. D. Moffat, ch. engr., rein.-con. retaining walls, abutments, culverts, for elevation of Pennsylvania R.R. tracks from Bainbridge to Dutoit St., to Bates & Rogers Constr. Co., 111 West Washington St., Chicago, Ill., $197,678. Noted June 12.

DAMS

CONTRACTS AWARDED

Kan., Moline—See "Waterworks."

PIERS AND WHARVES

BIDS ASKED

Man., Hecla—WHARF—July 10, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., extending wharf. $24,000.

Ont., Penetanguishene—WHARF—July 8, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, reconstructing wharf. $25,000.

Ont., Port Maitland—BREAKWATER—July 9, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, reconstructing breakwater (west pier). $40,000.

CONTRACTS AWARDED

Ont., Kenora—WHARF—N. Desjardins, secy. Dpt. P. Wks., Ottawa, wharf, to Macaw & Macdonald, Winnipeg, Man., $10,284. Noted Apr. 24.

Que., Ste. Flavie—WHARF—Dpt. P. Wks., Ottawa, Ont., extending wharf, to L. Lemoiux, Ste. Marie de Beauce, $11,097.

AIRPORTS

PROPOSED WORK

Tex., Harlingen — City, S. Botts, mayor, plans by Phelps & De Wees, 628 Gunter Bldg., San Antonio, airport, incl. shops, steel hangars, runways, etc. $200,000 bond election soon for same. Barreda & Stiles, National Bank of Commerce Bldg., San Antonio, engrs.

BIDS ASKED

Minn., Duluth—July 1, by J. Wilson, city engr., 85 x 120 ft. hangar and machine shop addition, at Williamson-Johnson Municipal Airport, $45,000. Sullivan & Oufalt, Duluth, archts. Noted June 4.

GRAIN ELEVATORS

PROPOSED WORK

Ont., Port Arthur — GRAIN ELEVATOR — Union Terminals Ltd., H. O.-300 Grain Exch. Bldg., Winnipeg, Man., 1,000,000 bu. grain elevator, rein.-con., concrete. $450,000. Engineer not selected.

CONTRACTS AWARDED

Kan., Kansas City—GRAIN ELEVATOR—Ismert-Hincke Milling Co., 1040 Bd. Trade Bldg., Kansas City, Mo., 500,000 bu. rein.-con. addition, to Industrial Eng. Co., 620 Central Bldg., Kansas City, Mo.

POWER AND LIGHTING

CONTRACTS AWARDED

Calif., Los Angeles—City electrolier system in Virgil Ave., to Osborn Co., 450 California Terrace, Pasadena, $25,650.

Calif., Los Angeles—Los Angeles Co., ornamental lighting system C. I. 896, to H. A. Reid & Co., 389 Clementina St., San Francisco, $25,758. Est. $28,198.

SPORTS AND PARKS

PROPOSED WORK

Calif., Sacramento—Pacific Coast Ice Hockey League, c/o Starks & Flanders, Forum Bldg., ice skating rink, 6,000 seating capacity on 300 x 300 ft. site, Alhambra Blvd. $750,000.

Conn., Hartford—See "Buildings—Unclassified."

Me., Bath—Y. M. C. A., W. C. Perkins, 24 Summer St., sketches by C. G. Loring, 7 Water St., Boston, Mass., 1 story, 60 x 100 ft., brick gymnasium, 22 x 62 ft. swimming pool, Front and Summer Sts. $45,000.

N. J., Bernardsville—J. J. McQuick, Jr., 22 Morristown Rd., preliminary plans rein.-con., tile swimming pool. Engineer not selected. $25,000.

N. J., Clifton—Passton Realty Co., J. P. White, Post Office Bldg., Passaic, concrete, tile swimming pool, Main and Getty Aves. $25,000. Engineer not selected.

BIDS ASKED

Mass., South Boston (sta. Boston)—July 3, by Park Dpt., 33 Beacon St., Boston, field house at Columbus Park. $30,000.

N. Y., New York—July 1, by W. C. Martin, archt., Flatbush Ave. extension and Concord St., Brooklyn, high school athletic field, incl. b'leachers, field house, at George Washington High School, Amsterdam, Fort George and Audubon Aves., for Bd. Educ., 500 Park Ave.

N. Y., New York—July 1, by Park Bd., W. R. Herrick, pres., Park Dpt., Arsenal Bldg., improving portions Ewen Park between Johnson and Riverdale Aves., and south of West 232nd St.; erecting three-row pipe fence along certain lawns, Riverside Park; water supply, iron picket fences, concrete curbing, and concrete benches Madison Square Park; lockers, benches in tennis house, in Central Park, opposite West 94th St.; repairing sheet asphalt and asphaltic concrete pavements in park and parkways in Manhattan Boro.

Pa., Mt. Lebanon—June 30, by Geisler & Smithyman, archt., 335 Blvd. of Allies, Pittsburgh, 100 x 250 ft. swimming pool, bath house in Municipal Park, for Mt. Lebanon Twp. $75,000. Vegeler Ramsey Co., Bowman Bldg., Pittsburgh, engrs.

Pa., Slippery Rock—July 2, by Slippery Rock Teachers College, J. Linwood Eisenberg, pres., brick on hollow tile gymnasium and concrete swimming pool. $100,000. W. G. Eckles Co., Lawrence Savings & Trust Bldg., New Castle, archts.

CONTRACTS AWARDED

Calif., Pasadena—City, rein.-con. addition to Rose Bowl to W. C. Crowell, 493 South Bway., Pasadena, $139,915.

Mass., Easton—Town, constructing Memorial Park, Sheridan and Walnut Sts., to Stone & Webster ,engrs. and contrs., 49 Federal St., Boston. Est. $25,000 or more. Stone & Webster, taking bids for tool house, etc.

Mo., St. Louis — Osborn Eng. Co., 7015 Euclid Ave., Cleveland, O., sub-let general contract (1st unit) athletic field stadium, to Gamble Constr. Co., 620 Chestnut St.; plumbing, to J. A. Lynch Plumbing Co., 1618 Chestnut St.; electrical work, to J. T. Finley, St. Louis, for St. Louis University, 221 North Grand Blvd. $250,000. Noted Mar. 20 under "Contracts Awarded."

Mass., Lynn—City, Park Dpt., golf course, Lynn Woods. $50,000. Owner builds. Noted Apr. 17.

N. J., Englewood—Bd. Educ., High School, rein.-con. stadium on high school grounds, to J. L. Bried, 96 West St., $35,460. Noted June 13. Plumbing, to W. Beck, 49 North Dean St., Englewood, $1,169; heating, to J. A. Grahn, 41 Highwood Ave., Tenafly, $1,170; electrical work, to Busch Bros., 101 West Palisades Ave., $750.

Pa., Edgeworth (mail Sewickley) — See "Clubs."

HEATING AND VENTILATING

PROPOSED WORK

Mass., Ashland—Town, Bd. Selectmen, installation new heating system, other changes in town hall. $25,000 or more. Engineer and architect not selected.

Wis., Superior—State Teachers College, A. D. S. Gillett, pres., 801 North 16th St., bids in July, replacing boilers of heating plant at Superior State Teachers College.

BIDS ASKED

Mass., Worcester — City, R. P. Spaulding, taking bids heating, plumbing, electrical work in high school. L. W. Briggs Co., 314 Main St., archts.

New York—July 1, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, installing heating and plumbing systems in Police and Comfort Station, and Sprain Lake Service Building at Saw Mill River Parkway and Sprain Lake Golf Course, Greenburgh and Yonkers. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. June 26.

CONTRACTS AWARDED

Mass., Boston—Boston Herald, 171 Tremont St., heating and ventilating in newspaper building, to J. S. Cassedy, 133 Austin St., Cambridge, est. exceeds $25,000; electrical work, to E. C. Lewis, Inc., 121 Federal St., est. $25,000; plumbing, to Pierce & Cox, 143 Kingston St., est. $25,000. Noted May 1 under "Factories and Mills."

Mich., Detroit—Bd. Water Comrs., 735 Randolph St., heating, ventilating and plumbing systems in Springwells Station of Detroit Water Supply Dpt., to J. W. Partlan, 14290 Goddard Rd., $130,284. Noted Apr. 24.

N. J., Kearny (sta. Arlington)—Bd. Educ., Kearny High School, boilers and oil burning equipment at Emerson School, to D. J. Kennedy, 502 North 4th St., Harrison. Est. $25,000. Noted May 29.

N. J., Secaucus—Bd. Freeholders Hudson Co., Court House, Jersey City, installing new boilers, equipment at County Penitentiary and Alms House, to J. P. Murphy, 24 Journal Sq., Jersey City, $78,700.

Okla., Oklahoma City—Oklahoma Co., heating plant for County Poor Farm, to E. G. Schwartz, 520 West 20th St., $30,000. Est. $32,000.

UNCLASSIFIED

PROPOSED WORK

Ky., Louisville — RIVER TERMINAL — See "Factories and Mills."

Unclassified (Continued)

Mass., Boston—TERMINAL—American International Eng. & Equipment Asso. Syndicate, c/o J. H. Hodsdon, engr., 53 State St., sketches 12 story, brick steel, rein.-con., ship and railroad terminal, incl. 9 buildings, four 210 x 530 ft. piers, railroad yards, viaducts, dredging, Mt. Vernon St., Dorchester. To exceed $150,000.

Mass., New Bedford—GENERATING PLANT—City, Bd. Aldermen, Municipal Bldg., generating plant. $25,000 or more.

N. Y., New York—COAL POCKET—Silver Coal Co., 1616 Webster Ave., plans by Derrick Hoist & Constr. Co., 539 Hudson St., coal pocket, 19 East 140th St. $40,000.

Utah—GAS MAINS—Utah Valley Gas & Coke Co., Provo, subsidiary C. Loomis Allen Interests, 149 Bway., New York, soon takes bids general and separate contracts extending 22 mi. gas pipe line and enlarging existing mains from Provo to Lehi. $600,000.

BIDS ASKED

Calif., Buena Vista — SHEEP RAISING PROJECT — Diamond Walnut Co., taking bids (1st unit) 96 x 288 ft., steel frame, corrugated iron, concrete foundations and flooring, near here. $500,000. H. K. Boone, 3034 Castle Heights, Palms Sta., Los Angeles, engr.

Calif., Oakland — RAILS, etc. — City Port Comn., 424 Oakland Bank Bldg., taking bids furnishing, installing steel rails and turnout for 220 ft. track for 14th Street wharf.

Mass., Malden (br. Boston)—COMFORT STATION—July 7, by City, F. J. Walsh, City Hall, 1 story, brick, concrete, steel, plain found., Huntings Field. $25,000. C. F. Springall, 50 Park St., archts. Noted Dec. 5.

New York—POLICE and COMFORT STATION, etc.—July 1, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, police and comfort station, police booths and Sprain Lake Service Building, Saw Mill River Parkway and Sprain Lake Golf Course, Greenburgh and Yonkers. J. Downer, Bronxville, ch. engr.

N. Y., Amenia—REFRIGERATION—July 9, by Commissioner Dpt. Mental Hygiene, Capitol, Albany, refrigeration work, D. F. Building (Kitchen and Dining Room), and S. B. Building (Bakery), at Wassaic State School; adv. E. N.-R. June 26.

N. Y., Buffalo—BOAT HOUSE—July 17, by Adjutant General, Div. Military & Naval Affairs, Capitol, Albany, boat house, for Buffalo Naval Militia.

N. Y., Ithaca—GREENHOUSES—July 15, by Commissioner Dpt. Educ., Education Bldg., Albany, greenhouses, at Cornell University, Heating, electrical work, sanitary work; adv. E. N.-R. June 26.

N. Y., New York—FIRE SPRINKLER—July 2, by Dpt. Mental Hygiene, State Office Bldg., Albany, automatic fire sprinklers, Old Branch Group, Manhattan State Hospital.

N. Y., New York—VAULTS, etc.—See "Contracts Awarded."

N. Y., Utica—FIRE SPRINKLERS—July 16, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, automatic fire sprinklers, Utica State Hospital; adv. E. N.-R. June 26.

Tenn., Memphis—CULVERT—July 1, at office D. C. Miller, city clk., concrete tunnel known as Huling Tunnel. W. Overton, mayor.

CONTRACTS AWARDED

Me., Rockland—MEMORIAL—Knox Memorial Assn., H. M. Lors, pres., memorial, to C. S. Henry & Co., 89 Broad St., Boston, Mass. Est. $25,000-$30,000.

Mass., Newton—CULVERT—City, Street Dpt., rein.-con. culvert over Stearns Brook, to C. & R. Constr. Co., 75 Bradeen St., Roslindale. Est. $25,000.

Mass., Wareham—RETAINING WALL—Town, Park Comn., rein.-con. retaining wall, cement walks, etc., at Bay View Grove, to H. M. Smith, East Wareham. Est. $25,000.

Michigan—FERRY DOCK—At office G. C. Dillman, state hy. comr., Lansing, dredging for and preparation 13 crib foundations, concrete approach, M. Br. 1 of 16, 22-C-7, Cheboygan Co. to State Constr., Lansing, $63,134. Noted May 1.

N. Y., New York—COMFORT STATION—J. Miller, pres. Manhattan Boro, Municipal Bldg., comfort station, to Delhan Constr. Co., 1325 54th St., Brooklyn, $21,985. Noted May 29.

N. Y., New York—VAULTS, etc.—National City Bank, 55 Wall St., altering vaults, boiler room, safe deposits, 2861 Bway., separate contracts. $75,000. A. G. Alexander, 52 Wall St., archt. Noted June 19.

Ont., Toronto—ELEVATOR SHAFT—Dpt. P. Wks., Parliament Bldgs., concrete, steel elevator shaft in Parliament Buildings, to J. S. Laxton, 34 Parkdale Rd. Est. $25,000.

Que., Sorel—SHEDS—Dpt. P. Wks., Ottawa, Ont., 2 rein.-con. sheds, Government Dock, to MacDonald Eng. Co. Ltd., Canadian Pacific Ry. Bldg., Toronto, $142,000.

MATERIALS

BIDS ASKED

CAST IRON WATER PIPE, etc.—Cumberland (mail Manville), R. I.—June 27, by Bd. Water Comrs., Town Hall, service supplies, incl. c.i. water pipe, various sizes. $5,000 or more.

SAND—New York, N. Y.—July 1, by P. J. Dooling, comr. Purchase, Municipal Bldg., screened sand to Dpt. Correction.

CONCRETE and SAND—St. George, N. Y.—July 2, by J. A. Lynch, pres. Richmond Boro. Boro Hall, 700 cu.yd. concrete and paving sand at Asphalt Plant Bureau Hys.

GRAVEL—Oklahoma—June 30, by State Hy. Dpt., Oklahoma City, furnishing and hauling 117,825 tons gravel for Hys. 14 and 41, Washita Co. A. R. Losh, hy. engr.

CABLES—Phila., Pa.—July 1, by Dpt. City Transit, C. E. Myers, dir., City Hall Annex, fire alarm and police signal cables underground Pedestrian Concourse, Contr. 31.

CONTRACTS AWARDED

GRANITE BLOCKS—Boston, Mass.—Dpt. P. Wks., granite blocks, recutting, redressing and reheading Mass. Ave., to J. and D. Mitchell Co., 286 Neponset Ave., Dorchester, $13,250. Noted May 29.

BRICK — Minneapolis, Minn. — F. S. Gram, city purch. agt., 16,000 interior and 140,000 exterior brick, to A. C. Ochs Brick & Tile Co., 204 South 8th St., $41 and $28 per 1,000 respectively. Noted May 22.

PIPE — Minneapolis, Minn. — City, 20,000 lin.ft. 6 in. c.i. pipe (centrifugally cast), to American Cast Iron Pipe Co., 712 Plymouth Bldg., $0.7275 per ft. Noted May 29.

WATER PIPE—Providence, R. I.—Bd. Contr. & Supply, City Hall, c.i. cement lined water pipe to Dpt. P. Wks., to U. S. Pipe & Fdry. Co., 1421 Chestnut St., Phila., Pa. Est. $5,000 or more. Noted June 12.

EQUIPMENT

BIDS ASKED

POST HYDRANTS—Boston, Mass.—June 27, by City, Dpt. P. Wks., 50 post hydrants for Water Div.

TRUCK—Grand Rapids, Minn.—July 1, by Water, Light, Power and Building Comns., Grand Rapids, one ½ ton truck.

AIR BRAKE SWITCH — Wellington, New Zealand—Sept. 30, by Secretary P. Wks., Supplies & Tenders Com., one 3 phase 50 kv. 200 ampere mechanically operated air brake switch, steel structure, set busbars, insulators and connections, set spares.

FOREIGN

Mexico — Aguila Oil Co., Mexico City and Tuxpan, Vera Cruz, plans oil pipe line from Tuxpan, Vera Cruz, to Mexico City, 8,000,000 pesos. Address owner.

Buildings

RESIDENTIAL

BIDS ASKED

Calif., Hollywood—See "Contracts Awarded."

N. J., Union — Owner, c/o F. A. Elsasser, archt., Morris Ave., taking new bids general contract 3 story, basement, brick, steel, plain found., Pine Ave. $150,000. Noted May 29.

N. Y., Kew Gardens — See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

Tex., McAllen—M. R. Nelson, 316 11th St., taking bids 11 story, basement, 50 x 140 ft., brick, rein.-con. hotel, 70,000 sq.ft. floor space, plain found. $375,000. H. P. Smith, Natl. Bank of Commerce Bldg., San Antonio, archts.

CONTRACTS AWARDED

Calif., Hollywood—W. I. Moffett, 203 Pacific Mutual Bldg., Los Angeles, 7 story, basement, 80 x 190 ft., rein.-con., brick, steel apartment, garage in basement, Crescent Heights Dist. $165,000. Owner builds. L. A. Bryant, 6513 Hollywood Blvd., Los Angeles, archt. Owner taking bids on sub-contracts.

Calif., Los Angeles—Central Holding Corp., 110 North Almeda St., 12 story, basement, 220 x 303 x 385 ft., rein.-con., steel, marble apartment hotel, Sunset Blvd. and Crescent Heights, to H. W. Baum Co., Central Bldg., $1,800,000.

Calif., Paso Robles—See "Theatres."

Calif., San Francisco — Coast Bay Co., 15 story, rein.-con., steel, Gough St. near Washington St., to Lindgren-Swinerton, Inc., 225 Bush St., $1,500,000.

Ill., Quincy—C. W. Nicol, archt., 310 South Michigan Ave., Chicago, general contract 8 story, 100 x 180 ft. hotel, to Buerkin & Buerkin, Quincy, for Lincoln-Douglass Hotel Corp., O. H. Davis, pres., c/o Abraham Lincoln Hotel, Springfield. Est. $500,000. Noted Mar. 12.

Md., Queenstown—T. Marsalis, c/o R. H. Dana, Jr., 350 Madison Ave., New York, apartment, Chester River, to G. E. Lane, Queenstown. Est. $150,000.

N. J., Atlantic City—Pomciana Hotel Co., 12 story, basement, 70 x 150 ft. hotel, North Carolina Ave., to Thompson Starrett Co., Packard Bldg., Phila., Pa. Est. $1,000,000.

N. J., Plainfield — Casa Bella Holding Co., c/o M. O. Klemm, archt., 43 Hill St., Newark, general contract 4 story, basement, brick, steel hotel, 415 West 7th St., to F. T. Ley & Co., Inc., 578 Madison Ave., New York. Est. $250,000. Noted Feb. 21.

N. Y., Kew Gardens—Wohlbro Imprvt., Inc., 149-27 Jamaica Ave., Jamaica, 6 story, 50 x 113 ft. apartment, Audley St. and Metropolitan Ave., separate contracts. $150,000. A. McLean, 149-27 Jamaica Ave., Jamaica, archt.

N. Y., New York—Bway. Sherman Realty Co., 103 Arden St., 6 story, 103 x 111 ft. apartment, 17 Dougan Pl., separate contracts. $170,000. A. E. Schaefer, 2408 Grand Concourse, archt.

N. Y., New York—London Terrace Corp., c/o H. Mandel, 10 East 40th St., 18 story apartment, 10th Ave. and 23rd Sts., to H. Mandel, 10 East 40th St. Est. $3,000,000.

O., Cleveland — Cleveland Hotel Co., L. E. Pierce, in charge, Marshall Bldg., brick, steel, stone hotel addition, to Aronberg-Fried Co., 21 East 40th St., New York. Est. $4,000,000. **Maturity indefinite.**

CLUBS

PROPOSED WORK

Calif., Long Beach — A. L. Peterson Post, American Legion, plans by Schilling & Schilling, Farmers and Merchants Bank Bldg., 2 story, rein.-con. $150,000.

Mass., Fall River—Fall River Woman's Club, c/o J. M. Darling, archt., 56 Main St., altering and constructing brick addition, 542 Walnut St. $150,000.

N. Y., Brooklyn—Y.W.C.A., 189 Montague St., bids September, 4 story, building, State and Nevins St. $150,000. Voorhees, Gmelin & Walker, 101 Park Ave., New York, archts. Noted June 4.

N. Y., New York—National Bureau Y. M. C. A., 347 Madison Ave., bids in September, general contract 16 story, Y. M. C. A., 220 East 47th St. $2,000,000. Warren & Wetmore, 16 East 42nd St., archts. Noted May 29.

BIDS ASKED

Calif., Santa Ana—July 10, by Committee Masonic Temple Assn., 4 story, basement, 90 x 120 ft., brick, steel, Sycamore Ave. and 5th St. $200,000. W. H. Austin, Pacific Southwest Bldg., Los Angeles, archt.

N. J., Hoboken—P. J. Jossier, archt., 240 Broad Ave., Palisades Park, bids about July 15, general and separate contracts, 2 story, basement, 90 x 180 ft., brick, steel golf club, for Owner, c/o architect. Noted June 12.

N. J., Perth Amboy—E. Wierzbicki, archt., 175 Smith St., bids about Aug. 1, general contract 3 story, basement, brick, steel, plain found., Elm St., for Fourth Ward Polish Citizens Club, c/o architect. $150,000. Noted May 15.

CONTRACTS AWARDED

N. Y., Rochester—Seneca Club, 7 story club house, East Ave. and Goodman St. S., to Thompson-Starrett Co., 250 Park Ave., New York. Est. $1,000,000. Noted Mar. 22, 1928.

Pa., Edgeworth (mail Sewickley) — Edgeworth Country Club, F. R. Dravo, chn. building com., East Dr., Sewickley, 3 story, basement, 138 x 214 ft., stone, brick, hollow tile incl. swimming pool, Beaver Rd., Academy Ave. and East Dr. extension, to Hutter Constr. Co., Fond du Lac, Wis. Est. $350,000. Noted May 22.

HOSPITALS

PROPOSED WORK

Ariz., Phoenix—Fitzhugh & Byron, archts., 206 Home Builders Bldg., soon lets contract 70 x 200 ft. medical clinic known as Lois Grunow Memorial Clinic, for W. Grunow. $250,000. Noted Apr. 24.

Conn., Hartford — Mt. Sinai Hospital, A. Cleland, supt., 119 Capital Ave., hospital addition. $150,000 or more. Engineer and architect not selected.

Ga., Atlanta—St. Joseph's Infirmary, Baker and Courtland Sts. N. E., plans by R. W. Alger, 1310 Candler Bldg., altering and constructing brick, stone addition, incl. enlarging chapel, operating rooms, etc. $150,000.

Ill., Danville — Bd. Dirs. Vermillion Co. Tuberculosis Hospital 2 or 3 story, rein.-con., brick. $150,000. Project temporarily in abeyance.

Massachusetts—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, plans by G. Robb, 14 Beacon St., Boston, 5 story, basement, brick, steel attendants home and assembly building (2 units of Metropolitan Hospital Group), Waltham, Belmont, Lexington. To exceed $150,000.

Mass., Everett — City, M. C. O'Neil, City Hall, soon takes bids 5 story, basement, 45 x 190 ft., brick, stone, concrete, steel, concrete found., Lawrence St. at Fremont Ave. $350,000. Kendall, Taylor & Co., 209 Columbus Ave., archts., and R. D. Kimball Co., 6 Beacon St., engrs., both Boston.

Mass., Malden (br. Boston)—Malden Hospital, E. P. Bliss, chn. com. in charge, soon takes bids 3, 4 and 5 story, basement, irregular sized, brick, stone, concrete, steel hospital group, Hospital Rd. $1,200,000. Kendall, Taylor & Co., 209 Columbus Ave., Boston, archts. Noted Jan. 16.

Mass., Quincy—City, T. J. McGrath, mayor, City Hall, plans by McLaughlin & Burr, 88 Tremont St., Boston, and soon takes bids altering and constructing 2 story, basement, brick, steel hospital addition, plain found. $150,000. Noted May 8.

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Hospitals (Continued)

Mass., Southbridge — Harrington Memorial Hospital, A. B. Wells, hon. com. chn., brick, steel, memorial hospital. $150,000. Engineer and architect not selected.

Mass., Springfield—City, F. C. Parker, mayor, plans by Kirkham & Parlett, 25 Harrison Ave., and bids in July, 3 story, 45 x 112 ft. and 5 story, 40 x 190 ft. isolation hospital, brick, steel, State St. $500,000. Noted Dec. 26.

Mich., Muskegon—Mercy Hospital plans by Van Leyen, Schilling & Keough, 3440 Cass Ave., Detroit, 2 story, basement, 40 x 180 ft., brick, steel, concrete nurses' home, plain found. $150,000. Noted July 11 under "Buildings—Commercial."

N. Y., Brooklyn—Delsim Corp., 61 Greene Ave. bids after July 15, general contract 6 story sanitarium, Greene Ave. and Adelphi St. $200,000. Scott & Prescott, 34 East 23rd St., New York, archt. Noted June 19.

Okla., Norman—Bd. of Affairs, Capitol, Oklahoma City, plans by Layton, Hicks & Forsythe, Braniff Bldg., 3 story, basement, brick ward building, on campus. $150,000.

Okla., Vinita—Bd. of Affairs, Capitol Oklahoma City, plans by Layton, Hicks & Forsythe, Braniff Bldg., Oklahoma City, 3 story, basement, on campus. $150,000.

BIDS ASKED

Me., Lewiston — July 2, by Central Maine General Hospital, and Coolidge & Carlson, archts., 89 State St., Boston, 2 story, basement, brick, steel, west wing, plain found. $150,000. Noted Mar. 13.

Mass., Boston—Boston Floating Hospital, E. Dope, chn., 244 Washington St., bids about July 1, 4 story, basement, brick, steel, plain found., Nashua and Ash Sts. $150,000 or more. Stevens & Lee, 45 Newbury St., archts. Noted Mar. 27.

Mass., Medford (br. Boston)—June 27, by Lawrence Memorial Hospital, 170 Governos Ave., and C. B. Dunham, archt., 6 Beacon St., Boston, altering and constructing 3 story, basement, brick, steel, stone nurses home addition, $150,000. R. D. Kimball Co., 6 Beacon St., Boston, engrs.

Mich., Flint — July 8, by Bd. Comrs. St. Josephs Hospital at Kalamazoo, 6 story, 150 x 280 ft., face brick, rein.-con., incl. nurses home, operating and service wing, power house. $300,000. D. A. Bohlen & Son, Indianapolis, archts.

N. Y., Brooklyn—July 10, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, isolation pavilion, nurses home, for Kingston Avenue Hospital, Albany Ave.

Ont., North Bay — June 28, by Reverend Mother Irene, c/o P. J. O'Gorman, archt., Mackey Bldg., Sudbury, 5 story, basement, 50 x 150 ft., concrete, brick, stone, steel, for Sisterhood of St. Joseph, 384 Rogers St., Peterborough. $300,000. Noted Apr. 24.

CONTRACTS AWARDED

Calif., Palo Alto — City, 2 story, rein.-con. hospital, to K. E. Parker, 135 South Park St., San Francisco, $341,650.

Mass., Worcester—City, Bd. Health, 3 story, tuberculosis hospital, brick, steel, rein.-con., to J. P. Keating Co., 80 Boylston St., Boston, $368,550; heating and ventilating, to Tucker & Rice, Inc., 165 Commercial St., est. $25,000 or more; plumbing, to McMahon & Murphy, 156 Institute Rd. and electrical work, to Economy Electric Co., 22 Foster St., both in Worcester, est. $25,000. Noted May 22.

Mich., Ypsilanti — G. R. Thompson, budget dir., 2 story, basement, brick, concrete, steel power house, tunnels, and allied structures, plain founds., for new State Hospital, to Otto Misch Co., 159 East Columbia St., Detroit, $1,300,886, for State Administrative Bd., Lansing. Noted May 1.

N. Y., Geneva—Bd. Trustees Geneva General Hospital, general contract hospital, to Harrison Eng. Co., Ellicott Sq., Buffalo, $191,185; heating and ventilating, to Wright & Alexander, 210 Otsego St., Rochester, $41,695; plumbing, to Riggs & Jensen, Geneva, $21,050. Grand total $253,930. Noted Apr. 17.

Pa., Phila.—Jefferson Hospital, 10th and Sansom Sts., 12 story, basement, 65 x 118 ft. and 41 x 68 ft., rein.-con., brick, steel, plain found., 10th and Sansom Sts., to Doyle & Co., 1519 Sansom St. Est. $1,000,000.

CHURCHES

PROPOSED WORK

Conn., New Haven—St. Thomas Episcopal Church, W. A. Beardsley, pastor, 10 Elm St., plans by Allen & Collins, 75 Newbury St., Boston, Mass., and soon takes bids 1 and 2 story, basement, irregular sized, brick, stone church, parish house, rectory. To exceed $150,000. Noted Nov. 21.

Mass., Arlington — St. James Parish, M. J. O'Connor, pastor, plans by W. B. Collery, 80 Boylston St., Boston, 1 story, basement, brick, stone, Appleton St. $150,000-$160,000.

Mass., Pittsfield—St. Marks Roman Catholic Society, M. J. Leonard, pastor, c/o W. Donahue, archt., 1200 Main St., Springfield, concrete, steel, granite, West St. $350,000.

Mo., Kansas City — St. Andrews Episcopal Church, rejected bids 2 story, basement church, $300,000. E. B. Deek, Myers Blvd. and Ward Parkway, archt. Noted May 1.

N. J., Arlington — Immaculate Conception Seminary, c/o Myers & Shanley, archts., 24 Walnut St., Newark, 2 story, basement, brick, steel, $150,000.

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N. J., Highland Park—Highland Park Baptist Church, c/o A. Merchant, archt., 1 Elm Row, New Brunswick, altering and constructing 2 story, basement addition, brick, steel, plain found. $150,000.

Pa., Grove City—Grove City College plans by W. G. Eckles & Co., Lawrence Savings & Trust Bldg., New Castle, 2 story, basement, stone church, chapel. $150,000.

Pa., Pittsburgh — Allegheny Co. Memorial Park, R. R. Mason, mgr., 1908 Law & Finance Bldg., plans by Janssen & Cocken, Century Bldg., stone chapel, stone, steel tower, 150-200 ft. high, Thompson Run Rd., Babcock Blvd. and Duncan Ave. $1,000,000.

BIDS ASKED

Mo., St. Louis — June 27, by St. Nicholas Greek Orthodox Congregation, c/o A. G. Rally, chn. Building Com., 824 Market St., 24 story, basement, 50 x 107 ft., rein.-con., brick, steel, Forest Park Blvd. $225,000. E. K. Eugene, 436 East 79th St., Chicago, Ill., archt. Noted June 5.

N. J., Bogota—A. A. Hayek, archt., English St., Fort Lee, bids about July 15, general contract 2 story, basement, brick, steel, plain found., Palisade and Elmwood Aves., for Church of Ascension, W. J. White, vicar. $150,000. Noted June 19.

N. J., Irvington (br. Newark)—N. Hulme, archt., 1524 Chestnut St., Phila., Pa., bids about Aug. 1, general contract 2 story, basement church, for Methodist Episcopal Church, R. L. Luerich, pastor, 64 Myrtle Ave. $150,000. Noted June 12.

N. J., Canford — Poggi & Bragdon, archts., 275 Morris Ave., Elizabeth, taking bids (selected list of bidders) altering and constructing 2 story, basement, brick, timber, convent addition, plain found., for Owner, c/o architect. $150,000.

CONTRACTS AWARDED

N. Y., New York—Roman Catholic Church of Sacred Heart, 1255 Shakespeare Ave., 2 story, 53 x 120 ft. church, to Frank O'Hare Co., 270 Madison Ave., New York. Est. $150,000. Noted May 29.

SCHOOLS

PROPOSED WORK

Ark., Conway—Hendricks College soon takes bids 3 story, basement, 100 x 200 ft., brick, timber, rein.-con. science building. $140,000. Wittenberg & Deloney, Home Life Bldg., Little Rock, archts. Noted Nov. 14.

Calif., Antioch — Antioch-Live Oak High School Dist. plans by Davis, Pearce Co., Builders Bldg., Stockton, 2 story, brick high school. $150,000.

Conn., New Haven—Yale University plans by Adams & Prentice, 15 West 38th St., New York, Button Hadden Memorial Building, brick, stone, York St. To exceed $150,000. **Maturity about October.** Noted June 5.

Conn., Stratford—See "Public."

Conn., Wallingford—Choate School plans by H. Steon, c/o owner, concrete, brick, stone gymnasium and exercise building, Mahlon Thatcher Hill. $200,000.

Ill., Evanston—Northwestern University bids in early fall general contract Deering Library, $1,000,000. James Gamble Rogers, 154 East 46th St., New York, archt. Noted Apr. 17.

Ind., Richmond — School Comrs. Wayne Co. plans by O. Hodge, Richmond, brick, steel, incl. stage, gymnasium. $150,000.

Mass., Ayer — Town, G. L. Wilson, chn. building com., sketches by R. H. Doane, 60 Battery March St., Boston, 2 story, basement, brick, stone high school, Main St. $150,000. Noted Apr. 17.

Mass., Haverhill—City, A. L. Barbour, supt. schools, 2 story, basement, brick, Bartlett Ave. $350,000. Engineer and architect not selected.

Mass., Holyoke — City, Bd. Educ., plans by G. P. Alderman Co., 316 High St., brick, steel vocational school, Beech St. $250,000.

Mass., Ipswich—Town, E. S. Cogswell, high school, probably brick and stone. $150,000-$200,000. Engineer and architect not selected.

Mass., Jamaica Plain (sta. Boston)—City of Boston, Dpt. School Buildings, sketches by McLaughlin & Burr, 88 Tremont Bldg., Boston, altering and constructing 2 story, basement, school addition, Agassiz Bowditch Dist. $150,000.

Mass., Medford (br. Boston)—City, A. Harty, chn. School Building Comn., plans by C. B. Dunham, 6 Beacon St., Boston, altering 3 story, basement, main building, Forest St. $150,000. Noted Feb. 27.

Mass., Medford (br. Boston)—Tufts College, J. A. Cousens, pres., sketches by Andrews, Jones, Biscoe & Whitmore, 50 Congress St., Boston, Fletcher School of Diplomacy, 2 and 3 story, basement, brick, limestone, steel. $200,000.

Mich., East Lansing—H. H. Halladay, secy. Michigan State College, plans by Malcolmson & Higginbotham & Trout, 1217 Griswold St., Detroit, 3 story, basement, 60 x 250 ft., brick, steel, stone, concrete dormitory, plain found., campus. $300,000. Noted May 22.

Minn., Moorhead—State Comn. Administration & Finance, Capitol, St. Paul, plans by C. H. Johnston, 360 Robert St., St. Paul, rebuilding 3 story, basement, rein.-con., brick, stone administration and power plant at State Teachers College, recently destroyed by fire. $200,000. Noted Feb. 27.

Mo., Perryville—St. Mary's Seminary, c/o Vincentian Fathers, soon lets contract 4 story, 75 x 200 ft., rein.-con., brick, stone dormitory, $200,000. H. P. Hess, 1001 Ambassador Bldg., St. Louis, archt.

N. J., Fort Lee—Bd. Educ., J. F. Whittaker, pres., High School, plans by Hacker & Hacker, 501 Main St., 2 story, basement addition to School 4, Palisade Ave., 150,000. Noted May 29.

N. J., Newark—Institute for Advanced Study c/o F. Fould, 602 Center St., South Orange, brick, steel college, plain found. $5,000,000. Engineer and architect not selected.

N. J., New Providence — Bd. Educ., school, $150,000. Engineer and architect not selected.

N. J., Pompton Lakes—Bd. Educ., T. J. Hutton, dist. clk., 96 Perrin Ave., soon receives competitive sketches Senior High School. $150,000. Engineer and architect not selected. Noted Dec. 1, 1927.

N. J., Summit—Bd. Educ., 272 Morris Ave., 2 story, basement, brick, steel, rein.-con., plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts.

N. Y., New York—Roman Catholic Church of St. Anthony, will award contract in Spring 1931, school, St. Lawrence Ave. and Mansion St. $250,000. J. A. Rossi, 1910 Arthur Ave., archt. Noted Apr. 24.

N. Y., Syracuse—Bd. Contr. & Supply, school on Forest Hill Dr. $250,000-$300,000.

N. C., Charlotte—Johnson C. Smith University, H. L. McCrory, pres., raising $400,000 funds, administration and classroom buildings for theological school and central heating plant.

Okla., Oklahoma City—Bd. Educ. plans by L. H. Bailey, 1207 Colcord Bldg., Shidler School, 2 story, basement, 78 x 150 ft., Byers and Oak Sts. $150,000.

Okla., Oklahoma City—Bd. Educ. plans by Layton, Hicks & Forsythe, Braniff Bldg., Senior High School, 2 story, basement, 170 x 375 ft., May St. $260,000.

Pa., Aspinwall—Shadyside Academy, Fox Chapel Rd., W. E. McKelvy, chn. Bd. Trustees, c/o McKelvy Hine Co., Columbia Bank Bldg., Pittsburgh, plans by E. P. Mellon, Koppers Bldg., Pittsburgh, and soon takes bids 3 story, basement, boys dormitory, brick, steel, Fox Chapel Rd. $150,000.

Pa., Dallas—Sisters of Mercy Nuserecordia, bids after July 5, general contract college, $350,000. F. E. Durang, 424 Madison Ave., New York, archt.

Pa., Grove City—Grove City College plans by W. G. Eckles, Lawrence Savings & Trust Bldg., New Castle, 2 story, 100 x 300 ft., brick, steel, hollow tile science building, on campus. $300,000.

Tenn., Johnson City—State Bd. Educ., Nashville, P. L. Harned, comr., plans by Coile & Cardwell, Johnson City, 3 story, 60 x 130 ft., rein.-con., brick, steel, tile library. $150,000.

Tex., San Antonio—Chaminade College, Society of Mary, Denny Rd., St. Louis, Mo. (owners of St. Mary's University and St. Mary's Academy, San Antonio), purchased 1,000 lin.ft. site and plan new college, North St. Mary's St.

Wis., Superior—Superior State Teachers College, rein.-con., brick library. $190,000. Engineer and architect not selected.

BIDS ASKED

Calif., Berkeley—July 8, by State Dpt. P. Wks., Sacramento, 2 story addition to school for blind.

Conn., New Milford — Town, J. Pettibone, taking bids Junior and Senior High School, 2 story, basement, brick, stone, $150,000. Towner & Sellew, 363 Main St., Middletown, archts. Noted May 15.

Ill., Joliet — Bd. Educ., Joliet Twp. High School, bids about July 7, 3 story, irregular shaped, brick, stone gymnasium, Jefferson St. $300,000. Burnham & Burnham, 160 North La Salle St., Chicago, archts. Noted Apr. 24.

Md., Catonsville (br. Baltimore)—June 27, by Smith & May, archts., Baltimore Trust Bldg., Baltimore, 3 story, basement, irregular sized, brick, stone high school addition, for Bd. Educ., Baltimore Co. $180,000.

Mass., Brighton (sta. Boston)—July 3, by Dpt. School Bldgs., Boston, altering and constructing 2 story, basement, brick, stone, steel addition, plain found., Strathmore Rd. corner Chestnut Hill Ave., for City of Boston. $150,000 or more. G. N. Jacobs, 114 State St., Boston, archt. Noted June 19.

Mass., Brockton—June 30, by Sacred Heart Parish, J. S. Vermette, 235 Court St., 2 story, basement, brick, steel parochial school, Manchester and Court Sts. $150,000. E. J. Laliberte, 234 Boylston St., Boston, archt. R. A. Fisher, 234 Boylston St., Boston, engr. Noted June 12.

Mass., Cambridge — Harvard College taking bids 3 story, basement, brick, stone, steel physical laboratory, plain found., college grounds. $500,000. Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., Boston, archts. Noted Oct. 17.

Mass., Dorchester (sta. Boston)—Owner, c/o M. Louis, archt., 73 Cornhill, Boston, taking bids 4 story, basement, brick, plain found., Talbot Ave. $150,000.

Mass., Westfield—July 1, by City, Finance Com., City Hall, 3 story, basement, boys trade school, brick, plain found. $175,000. M. W. Maloney, 23 Pearl St., Springfield, archt. Noted June 19.

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., bids about July 15, altering and constructing 2 story, basement, brick, steel addition, Grove St. $170,000. Schneider, Kleeman & Werther, 1007 Broad St., Newark, archts. Noted May 29.

Schools (Continued)

N. J., Leonardo—Middletown Twp. Bd. Educ., W. Petingale, secy., bids about July 1, 2 story, basement, brick, steel, addition to Leonardo School. $180,000. E. A. Arend, Kinmouth Bldg., Asbury Park, archt. Noted May 22.

N. J., Linden—Bd. Educ., St. George Ave., bids about Aug. 1, general contract 2 story, basement, brick, steel addition to School 2, Wood Ave $150,000. H. B. Brady, Inc., 333 North Broad St., Elizabeth, archt. Noted June 19.

N. J., Maplewood (br. South Orange)—Christ Lutheran Church, F. G. Muhlhauser, pastor, 239 Ward St., bids about July 15, general contract 1 story, basement, brick, stone, plain found. $150,000. W. L. Foster, 1900 Euclid Ave., Cleveland, O., archt. Noted May 22.

N. Y., Oxford—July 1, by Bd. Educ., general contract central school. Palmer Rogers, 1 Madison Ave., New York, archt. Noted June 19.

N. J., Perth Amboy — Bd. Educ., 261 State St., bids about July 15, altering and constructing 3 story, basement, brick, steel addition, Madison Ave. $150,000. Griesen & Tuzig, 175 Smith St., archts. Noted June 12.

N. J., Ridgefield Park—J. S. Pigott, archt., 42 Walnut St., Newark, new bids about July 1, general contract 1 story, basement, 110 x 155 ft., Mount Vernon St. and Euclid Ave., for St. Francis Roman Catholic Church. J. J. Butcher, 114 Mount Vernon St. $250,000. Noted June 19.

N. J., Riverdale—July 8, by Bd. Educ., Boro Hall, 2 story, basement, brick, steel, plain found. $150,000. Rasmussen & Wayland, 36 West 47th St., New York, archts. Noted June 26.

N. J., Riverdale—Bd. Educ., Boro Hall, bids about July 1, 2 story, basement, brick, steel, rein.-con., plain found. $150,000. Rasmussen & Wayland, 36 West 47th St., New York, archts. Noted Mar. 20.

N. J., Scotch Plains—Bd. Educ., High School, bids about Aug. 1, altering and constructing 2 story, brick, steel, rein.-con. addition, plain found., La Grande Ave. $150,000. J. N. Pierson & Son, 198 Jefferson St., Perth Amboy, archts. Noted June 12.

N. Y., Tuxedo Park—Bd. Educ., bids about June 25, general contract G. F. Baker High and Grade School, 3 story, basement, plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted June 19.

O., Alliance—Bd. Educ. bids about Aug. 13, 2 story, basement school, southwest section city. $150,000. Fox, Duthie & Foose Co., Union Trust Bldg., Cleveland, archts.

O., Columbus—July 9, by C. E. Steeb, secy. Bd. Trustees Ohio State University, 2-4 story, basement, 300 x 340 ft. brick, concrete, stone physical education and natatorium, on campus. $550,000. H. D. Smith, Ohio State University, archt.

Pa., Dallas—July 3, by Sisters of Mercy Misericorida College, college building. $300,000. E. I. Daugherty, 230 Park Ave., New York, structural engr. F. F. Durang, 424 Madison Ave., New York, archt.

CONTRACTS AWARDED

Calif., Pasadena — California Institute of Technology, four 2 and 3 story, 300 x 400 ft., rein.-con., clay, stone buildings, on campus, to W. C. Crowell, 495 South Bway. $800,000.

Calif., Sierra Madre — City School Dist., 2 story, part basement, 50 x 200 ft., rein.-con., steel, tile, Highland Ave., to J. C. Bannister, 4101 Goodwin Ave., Los Angeles. Est. $150,000.

Conn., New Haven—Yale University, graduate school, to M. Eidlitz & Son, Inc., 41 East 42nd St., New York. Est. $1,000,000.

Conn., West Hartford (br. Hartford) — St. Thomas Seminary, Bloomfield Rd., brick, stone, convent extension, incl. boiler house, to W. F. O'Neil, 983 Main St., Hartford. $278,000. Noted Apr. 10.

Ill., Chicago—Bd. Educ., 188 West Randolph St., masonry, concrete, terra cotta, cut stone contracts Lane Senior High School, incl. 5 units various sizes, Tudor Gothic design, 2,500 seating capacity auditorium, 2 gymnasiums, one 100 x 100 ft., also 11 acre athletic field, incl. stadium, baseball, football, basket ball and tennis courts, on 30 acre campus, to W. E. O'Neil Constr. Co., 308 West Washington St. $1,252,142. Total est. $6,000,000. Noted Apr. 24.

Ill., Glenwood—E. H. Clark, archt., 8 East Huron St., Chicago, (1st unit), 3 story, brick, stone administration building, for Glenwood Manual Training School, to Schmidt Bros. Constr. Co., 22 East Huron St., Chicago. $100,000. Total est. $350,000-$400,000.

Ind., Indianapolis — School Comrs., general contract Grade School 81, 2 story, basement, 74 x 148 ft., rein.-con., brick, 19th St. and Brookside Parkway, to Caldwell & Pruitt, 239 Cumberland St. Est. $165,000.

Md., Towson—Bd. Educ. Baltimore Co. and Smith & May, archts., Baltimore Trust Bldg., 2 story, basement, 128 x 205 ft., brick, stone, rein.-con. high school, incl. gymnasium, to Price Contg. Co., Maryland Trust Bldg., Baltimore. $180,000.

Mass., Cambridge—Harvard University, 2 story, basement, 120 x 120 ft., rein.-con., brick, steel geographical building, campus, to G. A. Fuller Co., 1421 Chestnut St., Phila., Pa., and 597 Madison Ave., New York. Est. $225,000.

Mass., Springfield—City, School Dpt., 2 story, basement, 160 x 160 ft., brick, limestone, granite, to W. A. Newton & Co., Mill River Lane. Est. $150,000. Noted May 8.

Mich., Hastings—C. W. Westpinter, clk. Bd. Educ., 2 story, brick, steel, stone, rein.-con., plain found., to C. M. St. John & Co., Saginaw. Est. $210,600. Noted May 8.

Minn., Alexandria—Bd. Educ., F. W. Stevens, clk., general contract 3 story, basement, rein.-con., brick addition, to Askov Constr. Co., Askov. $121,486. Noted Apr. 24.

Minn., St. Paul—Bd. Educ., L. R. S. Ferguson, comr., Endicott Bldg., general contract 2 story, basement, rein.-con., brick addition, to Lindstrom & Anderson, 903 Builders Exch. Bldg., $116,376. Noted May 8.

Mo., Springfield—See "Bids Asked."

N. Y., Canton — St. Lawrence University, general contract 2½ story, basement, 150 x 370 ft., brick, steel, rein.-con. dormitory, to Turner Constr. Co., 11 Goodell St., Buffalo. $600,000. Noted June 4.

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., general contract school, to J. J. Polewka Co., 2558 Grove St., Irvington. $300,000; plumbing, to Ruhl & Hatfield, Inc., 384 South 10th St., Newark, $24,605; heating, to J. H. Nelles Co., 835 Springfield Ave., $53,360; electrical work, to Broad Electric Co., 377 West Market St., Newark, $36,300. Grand total $414,315. Noted May 22.

N. Y., Baldwin—Bd. Educ., school addition, to W. A. Berbusse, 35 Bush Ave., Port Chester. Est. $250,000. Noted June 5.

N. Y., New York—Delaney & Schultz, archts., 162 East 37th St., general contract 3 story, 109 x 193 ft. school, dormitory, to T. J. Waters Co., 415 Lexington Ave., for All Hollows Institute. Est. $350,000. Contractor now taking bids on separate contracts. Noted Apr. 24.

O., Tiffin — City, general contract 2 story, basement, brick, steel, concrete, Minerva St., to Hossler Bros., Tiffin. $150,000.

Tex., Pampa—Bd. Educ., c/o J. N. Smith, constructing Ward School, and school additions, one school each to H. H. Smell, Lubbock; to Gray & Jaynes, Pampa; and to A. Boyington, Pampa. Total est. $200,000.

Wis., St. Francis—E. Brielmaier & Sons Co., archts., 425 East Water St., 3 story, basement, 190 x 269 ft. school, gymnasium, to E. Steigerwald & Sons Co., 5310 State St., Milwaukee, for St. Mary's Academy. Est. $400,000. Noted June 5.

THEATRES

PROPOSED WORK

Calif., Huntington Park—W. Maybock, 510 South Spring St., Los Angeles plans by P. R. Williams, 3839 Wilshire Blvd., Los Angeles, concrete, steel theatre. Fox West Coast Theatres, Inc., Washington and Vermont Aves., Los Angeles, lessee.

Calif., Los Angeles — Paramount Famous Lasky Corp., 5451 Marathon St., sketches theatre, store, office building, Sunset Blvd., Selma Ave., Vine and Argyle Sts. To exceed $2,000,000. Engineer and architect not selected.

Calif., Pasadena—A. E. Chotiner, La Brea Theatre Bldg., Los Angeles, sketches by S. C. Lee, Petroleum Theatre Bldg., Los Angeles, 2 story, 128 x 300 ft., 2,500 seating capacity, French type, Berkeley Ave. and East Colorado St. $350,000. Noted June 19.

Calif., San Francisco — See "Buildings — Unclassified."

Ia., Davenport — Third and Brady Streets Corp., c/o G. M. Bechtel, dir., 211 Brady St., and United Realties Co., lessee, soon take bids 9 story, basement, rein.-con., steel, incl. hotel, on 150 x 192 ft. site, 3rd and Brady Sts. $1,500,000 upwards. A. S. Graven, Inc., 100 North LaSalle St., Chicago, Ill., archts. Noted June 12.

Kan., Salina—Midland Circuit of Theatres, c/o M. B. Shanberg, 610 Midland Bldg., Kansas City, Mo., soon lets contract 2 story, basement, 120 x 125 ft., rein.-con., brick, steel, terra cotta, incl. office, stores. Boller Bros., 114 West 10th St., Kansas City, Mo., and C. W. Shaver, 828 United Life Bldg., Salina, archts. Noted June 19.

Md., Baltimore—J. J. Zink, archt., 2826 Overland Ave., soon lets contract 1 story, basement, brick, steel, concrete, Edmondson Ave. and Edgewood St., for F. H. Dinkee Enterprises, The Arcade Bldg. $150,000.

Mass., Lawrence—Salem Realty Co., Salem, and Paramount Publix Theatres, Paramount Bldg., New York, soon take bids general contract 2 story (ultimately 4 story), basement, irregular sized, brick, stone, steel, granite base. $1,000,000. Rapp & Rapp, 190 State Chicago, and 1501 Bway., New York, archts. Noted Apr. 17.

N. J., Perth Amboy—Warner Bros. Pictures, Inc., 321 West 44th St., New York, sketches by J. Eberson, archt., 370 Lexington Ave., New York, 2 story, basement, 105 x 260 ft., brick, steel, incl. stores, Smith and Maple Sts. $1,000,000. Noted Mar. 27.

N. Y., White Plains—Warner Bros., 321 West 44th St., New York, sketches by J. Eberson, 370 Lexington Ave., New York, theatre, Mamaroneck Ave. To exceed $150,000.

BIDS ASKED

Calif., Pomona — Fox West Coast Theatres, 1417 North Western St., taking bids selected list of bidders, 2 story, 105 x 190 ft., rein.-con., tile, stone, marble, plate glass 20,000 seating capacity, 3rd and Gary Sts. $275,000. Balch & Stanberry, Film Exch. Bldg., Los Angeles, archts. Noted Mar. 13.

O., Cincinnati—June 30, by Warner Bros., 321 West 44th St., New York, theatre. To exceed $500,000. J. Eberson, 370 Lexington Ave., New York, archt. Noted June 12.

CONTRACTS AWARDED

Calif., Paso Robles—T. and D. Enterprises, Inc., 988 Market St., San Francisco, theatre, store, apartment, to Salih Bros., Melrose and Western Aves., Los Angeles. $150,000.

Calif., San Pedro — Warner Brothers, Pacific States Theatres, 1708 Talmadge St., Los Angeles, Class A, rein.-con., steel theatre, to Lange & Bergstrom, Washington Bldg., Los Angeles. $200,000. Noted Feb. 27.

Ind., Hammond—F. P. Downey, general contract 3 story, basement, 100 x 150 ft., brick, steel, terra cotta, 3000 Calumet St., to C. Scott, 445 Lyons St. Est. $200,000.

Wis., Milwaukee—Warner Bros., 321 West 44th St., 12 story, basement, 100 x 150 ft., brick, steel theatre, office, 2nd and Wisconsin Ave., to G. A. Fuller Co., 597 Madison Ave., New York, for Wisconsin Enterprises, Inc., 321 West 44th St., New York. Est. $1,000,000. Noted May 29.

BANKS

PROPOSED WORK

Ariz., Phoenix—Valley Bank & Trust Co., W. Adams, sketches by Morgan, Walls, & Clements, 210 West 7th St., Los Angeles, Calif., and H. H. Green, Phoenix, 8 story, incl. office. $750,000.

Mo., Kansas City—William Rockhill Nelson Trust, c/o Wight & Wight, archts., 400 1st Natl. Bank Bldg., 3 story, mezzanine, 171 x 372 ft., rein.-con., marble, limestone, incl. power house, 44th St. and Rockhill Rd. $1,000,000.

N. J., South Orange—South Orange Trust Co., 53 South Orange Ave., sketches by Myers & Shanley, 24 Walnut St., Newark, altering and constructing 2 story, basement, brick, steel addition, plain found., South Orange Ave. $150,000.

N. Y., New York—Financial District Realty Co., c/o E. Cohen, 206 Bway., revised plans by Schwartz & Gross, 347 5th Ave., 23 story bank, office, stores, 101 Wall St. and Front St. $575,000. D. Oltarsh, 36 West 44th St., structural engr. Noted Apr. 17 under "Warehouses."

BIDS ASKED

Me., Bangor—July 1, by Eastern Trust & Banking Co., H. A. Littlefield, pres., c/o Hutchins & French, archts., 11 Beacon St., Boston, Mass., altering 2 story, basement, brick, stone, concrete, steel, plain found. $150,000.

R. I., Providence — Rhode Island Hospital Trust Co., 15 Westminster St., taking bids (extended), 2 story, basement, brick, steel, concrete branch bank, concrete found., Westminster St. $150,000. Jackson, Robertson & Adams, Turks Head Bldg., archts. Noted June 12.

CONTRACTS AWARDED

Minn., St. Paul—Graham, Anderson, Probst & White, archts., 80 East Jackson Blvd., Chicago, Ill., general contract 32 story, basement, brick, stone, steel, to Paul Steenberg Constr. Co., 914 Builders Exch. Bldg., for 1st Natl. Bank, E. A. Tyler, Merchants Natl. Bank Bldg. Est. $3,000,000. Noted May 15.

Steam heating, gravel roofing, etc.

N. J., Harrison—Harrison Natl. Bank, 4th St., general contract 2 story, basement, brick, steel, plain found., Harrison Ave., to Robert Allen, Inc., 319 Mount Pleasant Ave., Newark. Est. $150,000. Contractor taking bids on subcontracts.

OFFICES

PROPOSED WORK

Calif., Los Angeles—Fox Chicago Realty Corp., plans by S. T. Norton, 1210 Financial Center Bldg., 13 story, 52 x 124 ft., rein.-con., marble, steel, terra cotta, 608-20 South Hill St. incl. stores. $700,000.

Calif., Los Angeles — J. A. Wigmore, et al., plans by C. Beelman, 1019 Union Bank Bldg., 12 story office and 13 story hotel, incl. auditorium, 20,000 seating capacity providing 100,000 sq.ft. exhibition space, 7th St. between Garland and Bixee Sts. To exceed $3,000,000.

N. Y., Brooklyn—Martins Security, Inc., F. Zeitz, pres., will let contract without competition about July 15, altering 7 story, incl. stores, Fulton and Duffield Sts., $150,000. Levy & Berger, 375 Fulton St., archts. Noted June 19.

N. J., East Orange—J. F. Burrowes, archt., 505 Main St., soon lets general contract 3 story, basement, 60 x 180 ft., brick, steel, incl. stores, Main and Munn Sts., for Main and Munn Corp., A. J. Baldwin, pres., c/o architect. Noted June 12.

N. Y., New York—Carpenter-Madison Corp., J. H. Carpenter, pres., 551 5th Ave., bids late in fall or spring 1931, general and separate contracts offices, 515 Madison Ave. $2,000,000. J. E. R. Carpenter, 593 Madison Ave., archt.

N. Y., New York—S. Munskoff, 112 West 59th St., 16 story, 33 x 100 ft., incl. stores, 80 East 56th St. To exceed $200,000. **Maturity about Nov. 1.** Noted June 5.

Okla., Bartlesville—Phillips Petroleum Co., 7 story, 25 x 150 ft. brick addition, 4th St. $250,000. Private plans. A. H. Riney, Bartlesville, engr.

BIDS ASKED

N. J., Hackensack—P. J. Jossier, archt., 240 Broad Ave., Palisades Park, bids about July 15, general contract 2 story, basement, 60 x 120 ft., brick, steel, incl. showroom, stores, Main St., for Owner, c/o architect. $150,000. Noted June 19.

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Offices (Continued)

CONTRACTS AWARDED

Ind., Muncie — **W. C. Moore, c/o Houck & Smeneur,** archts., Muncie brick, steel office, apartment building, to C. R. Williams, Muncie. Est. $150,000. Noted June 5.

Ia., Des Moines—Burton Building Co., c/o B. Joseph, pres., 13 or 18 story, basement 88 x 123 ft., brick, steel, granite, terra cotta, to A. R. Neumann Co., 519 Hubbell Bldg. Est. $2,000,000. Noted Jan. 23.

N. Y., New York—S. Friedenberg, 15 West 47th St., 60 x 117 ft. office and loft, Gold, John and Platt Sts., separate contracts after July 15. To exceed $150,000. Springsteen & Goldhammer, 40 East 49th St., archts. Noted June 19.

N. Y., New York—One Hundred Fifty William Street Corp., H. A. Fartington, pres., 150 Williams St., altering and constructing 19 story addition, to Marc Eidlitz, 41 East 42nd St. Est. $900,000. Noted June 19.

Okla., Enid—Broadway Development Co., 14 story, basement, concrete, rein.-con., brick office and commercial building on 75 x 150 ft. site, 110-14 East Bway., to McMillen & Shelton Constr. Co., Enid. Est. $350,000. Noted June 5.

STORES

PROPOSED WORK

Mass., Fall River—Owner, c/o D. Shapiro, archt., 8 Main St., soon takes bids 3 story, basement, brick, steel, limestone, incl. offices, plain found. $200,000.

N. J., Paterson—Owner, c/o E. R. Coe, archt., 136 Washington St., sketches 3 story, basement, 75 x 120 ft., brick, steel store, apartment, $150,000.

CONTRACTS AWARDED

N. Y., White Plains—F. G. Shattuck Co., 60 West 23rd St., New York, store, to J. H. French Co., 110 East 42nd St., New York. Est. $200,000.

PUBLIC

PROPOSED WORK

Ala., Birmingham—ALMSHOUSE—Jefferson Co. Bd. Revenue, W. D. Bishop, chn., plans by G. P. Turner, Birmingham, almshouse at Ketona. $200,000.

Calif., Long Beach—CI. HALL—City plans by G. W. Firth, Long Bea. 5 story, rein.-con. addition. To exceed $150,000. Noted June 12.

Calif., Pasadena—AUDITORIUM—City plans by Bennett & Haskell, 311 1st Trust Bldg., and E. Bergstrom, Citizens Natl. Bank Bldg., Los Angeles, municipal auditorium, $1,050,000.

Conn., Stratford—TOWN HALL, etc.—Town, J. B. Wright, town mgr., town hall, 2 grade schools, $150,000 or more. Engineer and architect not selected.

N. Y., Mineola—JAIL—Bd. Supervs. Nassau Co., additional story to jail. $250,000.

BIDS ASKED

Mass., Brighton (sta. Boston) — COURT HOUSE—July 1, by City, of Boston, Dpt. P. Buildings, 2 story, basement, rein.-con., granite addition, concrete found., Chestnut Hill Ave., $160,000. O'Connell & Shaw, 134 Newbury St., Boston, archts. Noted June 5.

N. J., Belleville (br. Newark)—TOWN HALL—Bd. City Comrs., Town Hall, bids about July 15, reconstructing 3 story, basement, brick, steel, Washington and Belleville Aves. C. G. Jones, 280 Bway., New York, archt. Noted May 22.

N. J., Bloomfield—FIRE HOUSE—Bd. Town Council, Town Hall, bids about July 1, 2 story, basement, brick, steel, plain found. $150,000. Bartlett & Marsh, 24 Commerce St., Newark, archt. Noted June 19.

N. Y., Eastview—JAIL—July 17, at office F. L. Merritt, clk. Bd. Supervs. Westchester Co., Court House, White Plains, County Jail; adv. E. N.-R. June 26. Noted July 19.

Pa., Phila.—ADMINISTRATION—July 1, by Bd. Educ., J. D. Cassell, supt. buildings, 19th and Ludlow Sts., 9 and 12 story, 178 x 227 ft., rein.-con., brick, steel, stone, plain found., Spring and Garden Sts. I. T. Catharine, 19th and Ludlow Sts., archts. Noted June 19.

Pa., Pittsburgh—JUVENILE COURT HOME—July 1, by R. G. Woodside, controller, City County Bldg., test borings 3 story, 75 x 150 ft., brick, tile, Forbes St. near Craft St. $300,000. S. L. Roush, 519 Smithfield St., archt.

CONTRACTS AWARDED

Conn., Sound Beach — LIBRARY — Perrot Memorial Library Assn., 4 story, irregular sized, library, to Gillies-Campbell Co., 101 Park Ave., New York. Est. $150,000. Separate contracts awarded.

N. H., Unity—COUNTY—Sullivan Co. Comn., F. A. Aiken, Newport, 2 story, basement, concrete, steel, brick, tile, country farm, to Davison & Swanberg, 37 Amherst St., Manchester. Est. $150,000. Noted June 5 under "Newport."

New York—FIRE STATIONS—J. J. Dorman, comr. Fire Dpt., Municipal Bldg., New York. (a) general contract (b) heating (c) plumbing for fire stations in (1) Auburndale (2) South Jamaica (3) College Point (4) New Brighton (5) Mariners Harbor (6) South Beach (7) Fenton Ave., Bronx, New York, to Skolnick Building Corp., 100 West 34th St., New York (a1) $54,670; to F. S. Pizza & Co., 263 Manhattan Ave., Brooklyn (a2) $55,649; to J. A. Lee, 3103 Farragut Rd., Brooklyn (a3) $56,870; to Castor & Castor, 4205 New Utrecht Ave., Brooklyn (a4) $54,196 (a5) $56,190 (a6) $54,440 (a7) $54,180; to H. Silver (b1) $2,565; to J. B. Abbate, 42-13 162nd St., Flushing (b3) $2,338; to G. Cosgrove (c4) $3,270 (c5) $3,270 (c6) $3,270; to J. Stumpelli (c1) $2,726 (c2) $2,726 (c3) $2,726; to A. Beckerman, (c7) $3,469. Grand total $414,549. Noted May 22.

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Que., Quebec — COURT HOUSE — Dpt. P. Wks., masonry and eaves for court house, to F. Jobin, Quebec, $102,309; carpentry and woodwork, to E. Frenette, $110,296; marble, tile and terrazzo, to Bronze & Woods Products, local representative of Smith Marble & Constr. Co. of Montreal, $119,480. Grand total $332,085.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Calif., San Francisco—COMMUNITY CENTER—Jewish Community Center, c/o Hyman & Appleton, archts., 68 Post St., sketches rein.-con. community center building, incl. theatre, club rooms, hall, California St. $650,000.

Conn., Hartford — COMMUNITY — Central Council Social Agencies, 15 Lewis St., plans by Lester Beach Scheide, Inc., 15 Lewis St., 4 story, brick, steel, incl. swimming pool, gymnasium. $200,000.

Mass., Lynn — EXCHANGE — New England Telephone & Telegraph Co., 50 Oliver St., Boston, sketches by Densmore, Le Clear & Robbins, Park Sq. Bldg., Boston, brick, stone, City Hall Sq. To exceed $150,000. Noted Sept. 5.

Mass., Newton — EXCHANGE — N. E. Telephone & Telegraph Co., 50 Oliver St., Boston, sketches by P. A. Hopkins, 45 Bromfield St., Boston, altering and constructing brick telephone exchange, 847 Beacon St. $150,000.

O. Sandusky—HOME—F. O. E., soon lets contract 3 story, basement, 100 x 100 ft. home, $150,000. H. Parker, Feick Bldg., archt.

Okla., Oklahoma City—STATION—St. Louis-San Francisco Ry. Co., 610 Frisco Bldg., St. Louis Mo., F. G. Jonah, ch. engr., and Chicago, Rock Island & Pacific Ry. Co., LaSalle Street Sta., Chicago, Ill., W. H. Peterson, ch. engr., soon lets contract 1 story tower basement, 222 x 360 ft., concrete, brick, steel station, Bedford stone, incl. two 1,300 ft. platforms, boiler house. $2,500,000. Noted June 19.

Pa., Morgan — CHILDREN'S HOME — Bd. Comrs. Green Co., R. I. Lemley, clk., Court House, Waynesburg, soon take bids 3 story, basement, 47 x 100 ft., brick, steel, stone, hollow tile. $100,000. H. W. Altman, Fayette Title & Trust Bldg., Uniontown, archt.

Pa., Phila.—TEMPLE MUSIC, etc.—Corporation to be formed, c/o A. M. Greenfield, Bankers Trust Bldg., sketches by C. Howard Crane, 1001 Fox Bldg., Detroit, Mich., temple of opera, drama and music, 19th, Race and Parkway Sts. $4,000,000.

BIDS ASKED

Mass., Greenfield—EXCHANGE—New England Telephone & Telegraph Co., 245 State St., Boston, taking bids 3 story, basement, 85 x 90 ft., brick, concrete steel, concrete found., Federal St. $150,000. Densmore, LeClear & Robbins, Park Sq. Bldg., Boston, archts.

N. J., Gladstone—ORPHANAGE—DePace & Juster, archts., 151 West 46th St., New York, bids about Aug. 15, general contract 2 story, basement, brick, steel, plain found., for Villa O'Connor Orphanage. $150,000. Noted June 4.

N. Y., New York—EXCHANGE—New York Telephone Co., 1775 Grand Concourse, bids about July 15, general contract 3 story, 108 x 142 ft., Tratman and Rowland Aves. $300,000. Voorhees, Gmelin & Walker, 101 Park Ave., archts. Noted June 12.

O., Mansfield—SALES and SERVICE—Auxter Motor Co., P. W. Auxter, mgr., 41 West Temple St., taking bids 3 story, basement, 76 x 156 ft., brick, rein.-con. $200,000. H. G. Millott, Bliss Bldg., Sandusky, archt.

CONTRACTS AWARDED

Calif., Hollywood—RECORDING STUDIO—R. C. A. Victor Co., Inc., Camden, N. J., 2 story, brick, steel, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $250,000.

Wis., Madison—EXCHANGE—Wisconsin Telephone Co., 418 Bway., Milwaukee, 4 story, 57 x 82 ft. addition, to G. Nelson & Son, Madison.

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Broderick — MILL — California Rice Growers Assn., E. L. Adams, pres., Chico, sketches rebuilding plant recently destroyed by fire. $450,000 loss.

Calif., Hollywood — NEWSPAPER PLANT — Hollywood News Publishing Co. plans by F. D. Rutherford, Mills-Fraser Bldg., Santa Monica, 2 story, basement, 145 x 145 ft., rein.-con., Class A, Wilcox Ave. $200,000 or more.

Calif., Huntington Beach—FACTORY—J. I. Wright, 1331 East 3rd St., Long Beach, sketches factory, $50,000. Engineer and architect not selected.

Calif., Manteca—CONDENSARY PLANT—Meyenberg Laboratories, Inc., Salinas, milk condensary plant. $200,000. Engineer and architect not selected.

Calif., Pomona — NEWSPAPER PLANT — Progress-Bulletin Publishing Co., plans by L. Rogers, 2412 West 7th St., Los Angeles, 2 story, basement, 120 x 220 ft., rein.-con. plant.

Calif., Stockton—MILL—Fisher Bros. Planing Mill, F. T. Fisher, pres., rebuilding plant, recently destroyed by fire. $50,000.

Ill., Vandalia — REPEATER STATION — American Telephone & Telegraph Co. (Long Lines Division), 208 West Washington St., Chicago, repeater station. $200,000.

Ind., Seymour — FACTORY — Reliance Mfg. Co., sketches 2 story, basement, 60 x 100 ft. brick, steel, stone. $43,000. Private plans.

Ky., Louisville—OIL PLANT—National Consumers Oil Co., Terre Haute, Ind., oil plant, incl. refinery, warehouses, river terminal, six storage tanks, several filling stations. $250,000.

Minn., Albert Lea—PACKING PLANT—Wilson Packing Co., W. W. Bowers, supt., brick, concrete steel addition. $150,000. Private plans.

Mass., Boston—BAKERY—Owner, c/o Schein & Levine, archts., 333 Washington St., taking bids 1 story, 60 x 100 ft., brick, steel, bakery, warehouse, concrete found. $40,000. Noted May 29.

Mass., Chicopee—REFINERY—A. G. Spaulding & Co., refinery. $40,000-$50,000. Engineer and architect not selected.

Neb., Omaha—OIL PLANT—Quaker Petroleum Co., 14th and Nicholas Sts., concrete, brick oil compounding and barreling plant, 20th and Hickory Sts. $150,000.

N. J., Bound Brook—FACTORY—Calco Chemical Co., 286 Spring St., New York, soon takes bids general contract plant, office. $150,000. Joannes & Marlow, 420 Lexington Ave., New York, archt. Lange & Noska, 420 Lexington Ave., structural engrs.

N. Y., Brooklyn—MILK DEPOT—Sheffield Farms, 524 West 57th St., bids in July, 6 story, milk depot, Fulton St. and New York Ave. $150,000. F. A. Rooke, 12 East 41st St., New York, archt. Noted June 4.

Pa., Franklin—FACTORY—Owner, c/o J. Rulifson, archt., Ellicott Bldg., Jamestown, N. Y., 1 story, 80 x 200 ft., brick, tile. $40,000.

R. I., Cranston—PLANT—Universal Winding Co., 3 story, 58 x 161 ft., brick, timber textile winding plant. $80,000. Private plans.

Wash., Bremerton—GAS PLANT, etc.—National Gas Corp. of Washington, H. W. Burkhart, representative, gas plant, mains. $300,000.

Wash., Seattle—FACTORY—Albatross Steel Equipment Co., 557 Market St., San Francisco, factory, 10,000 sq.ft. floor space.

Ont., Toronto—PLANT—Canada Foils Ltd., 75 Fraser Ave., plans by F. S. Mallory, 11 Roseberry Ave., 1 story, 100 x 100 ft., steel, concrete, brick top addition, Fraser Ave. $50,000.

Ont., Thorold—B. R. Noble, town clk., bids early in July, concrete paving 4.5 mi. Carleton, Queen, Patricia, Richmond, Regent, Ann Sts., 30 to 36 ft. $200,000. A. Smith, Town Hall, engr.

BIDS ASKED

Miss., Greenville—COTTON COMPRESS—See "Bids Asked."

Pa., Marienville — FACTORY — Marienville Glass Bottle Co., R. R. Underwood, pres. in charge, taking bids rebuilding 1 story, 100 x 200 ft. 45 ft. high in center, steel, Forest Co. $100,000. Private plans.

Pa., Uniontown — PLANT — See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Fresno — CASEIN PLANT — Danish Creamery Assn., East and Inyo Sts., 1 story, fireproof, to T. M. Paulsen, 3666 Illinois St., $45,000.

Calif., Los Angeles — BAKERY — Grandma Baking Co., 735 Arlington St., Oakland, 1 and 2 story, 130 x 150 ft., concrete, brick, steel, 671 Antonia St., to G. M. Hanson, 6534 Moore Dr., $181,000.

Calif., San Mateo — CREAMERY — Jersey Farm Creamery, 2 story, rein.-con., to Sierra Constr. Co., 235 3rd Ave., $40,000. Noted May 8.

Calif., Wilmington—PLANT—Los Angeles Soap Co., Griffith Co., Los Angeles Ry. Bldg., Los Angeles, 1 story, 40 x 340 ft., rein.-con., brick, steel, Mormon Island, to Consolidated Steel Corp., 1200 North Main St., Los Angeles, $50,000.

Conn., Hartford—FACTORY—Superior Spring & Mfg. Co., 373 Washington St., 2 story, 60 x 130 ft., brick, to S. Martin, 107 Love Lane. Est. $65,000. Noted Feb. 13.

Fla., Avon Park—PACKING PLANT—American Fruit Growers, J. B. Powell, mgr., 1 story, 120 x 175 ft., concrete, to York Constr. Co., Raleigh, N. C., $50,000. Noted May 29.

Ind., Ft. Wayne—FACTORY—General Electric Co., 1635 Bway., general contract brick, steel, Wilter St., to Indiana Eng. & Constr. Co., 201-3 Central Bldg. Est. $41,000.

Factories and Mills (Continued)

Ind., Hammond—SERVICE—P. W. Meyer, general contract rein.-con., brick, steel super-service station, to F. C. Rowley, 520 1st Trust Bldg. Est. $40,000. Noted June 12.

Kan., Wichita—FACTORY and ADMINISTRATION—United Aircraft & Transportation Co., 1 and 2 story, brick, steel factory, administration building, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $1,000,000 incl. equipment.

Mass., Athol—FACTORY—Union Twist Drill Co., improving 2 story, brick, timber, to E. J. Cross Co., 82 Foster St., Worcester. Est. $40,000.

Mass., Cambridge — FACTORY — Macalaster-Bicknell Co., 28 Wendall St., Boston, 1 story, 55 x 100 ft., brick, steel, concrete found., Moore and Washington Sts., to R. Gleason, 304 Belgrade Ave., Roslindale. Est. $40,000 or more. Noted May 22.

Mass., Everett—CHEMICAL PLANT—Merrimac Chemical Co., 3 story, 85 x 110 ft., sulphur acid building, brick, steel, concrete found., to Leonard Constr. Co., 37 South Wabash Ave., Chicago, Ill. Est. $50,000 or more. Noted Apr. 10.

Mo., Shrewsbury—GENERATOR—St. Louis County Gas Co., Webster Groves, 1 story, 57 x 61 ft., rein.-con., brick, steel generator building addition, to Woermann Constr. Co., 1441 Syndicate Trust Bldg., St. Louis; steel, to Mississippi Valley Structural Steel Co., 3110 Big Bend Blvd., Maplewood.

Mo., St. Louis—SIGN FACTORY—Federal Brilliant Co., 3531 Washington Ave., 4 story, basement, 33 x 57 ft., brick, concrete, 3522 Washington Ave., to H. O. Hirsch & Co., Wainwright Bldg.

Miss., Greenville — COTTON COMPRESS — Delta Compress Co., c/o W. T. Wynn of Wynn & Hafter, remodeling compress, local labor under supervision own superintendent. $200,000. Private plans.

N. Y., New York — FACTORY — Foot-Form Shoe Co. (lessee), 13 West 39th St., altering factory, to Deikes Contg. Corp., 163 West 22nd St. Est. $40,000. Noted June 19.

Pa., Manayunk (sta. Phila.)—MILL—J. Wilde Bros., 3702 Cresheim St., Phila., 3 story, basement, 47 x 100 ft., rein.-con., brick, plain found., 3737 Main St., to J. L. Fawley, 2121 Walnut St. Est. $75,000.

Pa., Uniontown—PLANT—Liberty Explosives Corp., J. H. Lytle, secy., 1406 Clark Bldg., Pittsburgh, plant, incl. railroad sidings, tram roads, 15 to 20 buildings, on 1,200 acre tract, Connellsville-Uniontown Rd., near here, separate contracts. Now taking bids on structural steel. Private plans.

Wis., Mayville — FACTORY — Wisconsin Radiator Furniture Co., general contract 1 story, 47 x 175 ft. and 60 x 60 ft. factory, to Rhode-Kappelle Co., Mayville; roofing, to C. Engel & Son, Watertown; carpentry, to H. Zwieg & Son, Watertown; painting, to H. Mueller & Son, Watertown; electrical work, to O. Roll, Kekoskee.

Utah, Farnham (mail Wellington) — ICE PLANT—Carbon Dioice & Chemical Co., Seattle, Wash., W. M. Foulton, pres., Conrad, Mont., ice plant, to Frick Machine Co., Waynesboro, Pa. Est. $150,000. Noted Feb. 13.

Wash., Seattle—BAKING PLANT—Langendorf United Bakeries, Inc., 2 story, rein.-con., 13th Ave., to Barrett & Hilp, 918 Harrison St., San Francisco, Calif., $150,000.

Ont., Hamilton — FERTILIZER PLANT — Grasselli Chemical Co. Ltd., (subsidiary of Canadian Industries), Federal Bldg., Toronto, 1 story, 117 x 240 ft., steel, concrete found., to Anglin-Norcross Ltd., Temple Bldg., Toronto. Est. $200,000.

Ont., Windsor—FACTORY—Universal Button Co., Walkerville, I. D. Ford, mgr., rebuilding 1 story, 75 x 175 ft., concrete, brick, steel, recently destroyed by fire, to Allen & Earl, 24 Chatham St. W. Est. $50,000.

GARAGES

PROPOSED WORK

Ark., Little Rock—Bale Chevrolet Co. soon takes bids 1 story, basement, 140 x 200 ft., brick, steel, rein.-con. garage, warehouse, service building, 2nd St. and Bway. $100,000. Wittenberg & Deloney, 807 Home Life Bldg., archts.

Md., Baltimore—J. E. Sperry, Calvert Bldg., archt., soon lets contract 2 story, basement, 168 x 202 ft., brick, concrete, steel, remote delivery and garage building, Josephine St. between Pine and Arch Sts., for Stewart & Co., Howard and Lexington Sts. $200,000.

Mass., Brockton — Eastern Massachusetts Street Ry., 38 Chauncy St., Boston, converting car house into 1 story bus garage. $50,000. Private plans.

Mass., Marblehead — Town, Electric Light Dpt., plans by W. H. Quiner, 75 Pleasant St., 2 story, brick, service garage, Commercial St. $40,000.

N. Y., Brooklyn—Hillel Dworkin, 1626 East 10th St., soon takes bids on revised plans general contract 2 story service garage, West 37th St., and Mermaid Ave. $40,000. M. A. Cantor, 124 Livingston St., archt. Noted June 19.

N. Y., Long Island City—Woodhaven Liberty Realty Co., 565 5th Ave., Brooklyn, sketches service garage, Rockaway Blvd. and 93rd St. $50,000.

Pa., Bradford—T. K. Hendryx, archt., Tidewater Bldg., soon lets contract front 1 and 2 story, rear 3 and 4 story, 113 x 200 ft., brick, rein.-con., 50 East Main St., for Rickerson & Pryde, Inc., 4 Boylston St. $150,000.

Tenn., Knoxville—M. D. Arnold, pres. Fidelity-Bankers Trust Co., announced plans bus terminal. $200,000. Union Bus Station, Inc., Tennessee Coach Co., et al, interested.

BIDS ASKED

N. Y., New York—Siegel & Levy, archts., 1775 Bway., taking bids general contract 4 story, 100 x 100 ft. service garage, 304 East 64th St., for Corcoran Fitzgerald & Co. Noted June 19.

CONTRACTS AWARDED

Md., Baltimore — Ditch, Bowers & Taylor, Charles and Oliver Sts., 2 story, basement, irregular sized, brick, rein.-con. garage, service station, Mt. Royal St. and North Ave., to C. L. Stockhausen Co., Gay and Water Sts., $100,000.

Mass., Fall River—Eastern Mass. Street Ry. Co., 38 Chauncy St., Boston, 1 story, 60 x 120 ft., brick, steel, concrete bus garage, repair shop, Stafford St., to E. J. Rappoli, 515 Mass. Ave., Cambridge. Est. $40,000. Noted June 5.

Mass., Medford (br. Boston) — Somerville Auto Body Co., 643 Bway., Somerville, 1 story, 75 x 100 ft., brick, steel auto body shop, plain found., 646 Boston Ave., to A. R. D'Italia, 85 Adams St. Est. $40,000. Noted Nov. 28.

N. Y., New York—P. Cappell, 70 Bowery, 3 story service garage, to J. Mitchell, 332 West 24th St. Est. $200,000. Noted June 12.

Ore., Portland — Pacific Greyhound Stage Lines, general contract 1 and 2 story, 200 x 240 ft., brick stage garage and terminal, Shendom and Hood Sts., to Dougan-Hammond Constr. Co., 168 Thompson St., $114,302; plumbing and heating to Plumbing & Heating Sales Corp., 170 East 6th St., $22,806; electrical work, to Morrison Electric Co., 454 Washington St., $7,057. Grand total $144,165.

POWER PLANTS

PROPOSED WORK

Calif., Pasadena—City plans by Bennett & Haskell, 1st Trust Bldg., rein.-con. addition to light plant. $150,000.

Idaho, Silver City—Trade Dollar Consolidated Mining Co., W. White, supt., hydro-electric plant at Swan Falls Power site on Snake River. $250,000. A. J. Wiley, Boise, engr.

Ind., Indianapolis — Indianapolis Power & Light Co., N. Perry, pres., 200 ft. square power station between South Harding St. and White River 1 mi. south of Troy Ave. $12,267,075.

Minn., Moorhead—See "Schools."

Utah, Fillmore—City Council, municipal hydro-electric plant on Chalk Creek. $30,000. C. Callister, Fillmore, engr.

Ont., Sudbury—Hydro-Electric Power Comn. of Ontario, 190 University Ave., Toronto, F. A. Gaby, ch. engr., high voltage substation, concrete, brick, steel in connection with power transmitted from Abitibi Canyon. $250,000.

BIDS ASKED

Kan., Topeka—See "Contracts Awarded."

Mass., Lawrence — Meadow Brook Laundry Co., 17 North Methuen St., taking bids 1 story, brick, steel power house, plain found., North Methuen St. $40,000, incl. equipment. H. Petzold, Bay State Bldg., archt.

Mo., St. Louis—July 1, by Bd. Educ., 911 Locust St., 1 story, basement, 70 x 150 ft., rein.-con., brick power house, incl. stack, sewers, boilers, stokers, conveyor equipment, engines, generators, exciters, switchboard and wiring, School St. $248,000. G. W. Sanger, acting comr, buildings. Noted May 29.

O., Columbus—July 16, by Bd. Comrs. Franklin Co., altering, repairing and constructing addition to power plant at Franklin County Home. W. H. Tremaine, 28 East Broad St., archt.

Man., Churchill—July 10, by J. W. Pugsley, secy. Dpt. Railways & Canals, Ottawa, Ont., generator room and boiler house equipment for power plant. A. E. Dubuc, Dpt. Railways & Canals, Ottawa, Ont., ch. engr.

CONTRACTS AWARDED

Conn., Bridgeport — United Illuminating Co., 1119 Broad St., foundation for turbine, other electrical equipment for power plant, to R. E. Hurley Constr. Co., 120 Pequonnock St., $95,000.

Ind., Greensburg—Cyclone Fence Co., general contract rein.-con., brick, steel power house, to Krebay Constr. Co., 802 New City Transit, Indianapolis. Est. $40,000.

Kan., Topeka—Kansas Power & Light Co., 1 story, 53 x 72 ft., brick, tile, stucco, 12th and Winter Sts., sub-contract basis. $50,000, incl. equipment.

Mass., Attleboro—L. G. Balfour & Co., 25 County St., 1 story, brick, steel, timber power plant for factory, County St., to H. O. MacKinnon & Co., 38 Emery St. Est. $40,000-$50,000. Noted May 8 under "Contracts Awarded."

Mass., Worcester — Worcester Electric Light Co., 2 Foster St., 1 story, brick, rein.-con., steel, electric power sub-station, 66 Taraday St., to New England Power Constr. Co., 89 Broad St., Boston. Est. $40,000 or more.

Mo., Bagnell—Union Electric Light & Power Co., 315 West 12th Blvd., six 23,888 kva. umbrella type vertical waterwheel generators; two 3,000 kva. vertical waterwheel generators; and seven 150 kw. motor-generator exciter sets, etc. for hydro-electric power plant under construction on Osage River near here, to Westinghouse Electric & Mfg. Co., 411 North 7th St., St. Louis, Mo. Est. $1,000,000.

N. J., Bloomfield — General Electric Co., Lawrence St., general contract 1 story, basement, brick, steel addition to Electric Sub-Station Building 2, to R. Allen, Inc., 319 Mount Pleasant Ave., Newark. Est. $40,000. Noted Apr. 17.

N. J., Northfield—Bd. Freeholders Atlantic Co., Guarantee Bldg., Atlantic City, general contract 1 story, power and heating plant addition, to P. T. Hannum, Atlantic City. Est. $40,000. Noted June 5.

SHOPS AND FOUNDRIES

PROPOSED WORK

Mass., Brighton (sta. Boston) — SHOP — Commonwealth Garage, Brighton Ave., soon takes bids altering and reconstructing 1 story, brick, steel repair shop and station. $40,000. W. F. Bryant & Son, 334 Washington St., Brookline, engrs.

Tenn., Memphis—SHOP—Smith Motor Coach Co., 144 North Front St., F. Smith, pres., plans by Jones & Furbringer, Porter Bldg., 2 story, 62 x 150 ft., rein.-con., brick, terra cotta, 222 Washington Ave. $45,000. A similar building, 80 x 114 ft. to be built at Jackson.

Tex., Borger — MACHINE SHOPS — Phillips Pipe Line Co. & Phillips Petroleum Co., machine shops. To exceed $150,000.

BIDS ASKED

Mass., Springfield—SHOP, etc.—City, Bd. P. Wks. taking bids 3 story, basement, brick, steel repair shop and city mechanical plant. $100,000. McClintock & Craig, 485 Bridge St., archts. Noted June 5.

CONTRACTS AWARDED

Ind., Rushville—FOUNDRY—Mullins-Gibson Co., general contract rein.-con., brick, steel, hollow tile, to W. C. Bishop, Rushville. Est. $40,000.

O., Cleveland—FOUNDRY—Harshaw Chemical Co., D. T. Perry, secy., 1945 East 97th St., 1 story, brick, steel, 1000 Newburgh Ave., to M. Swisher, 5927 Euclid Ave. Est. $40,000. Noted June 19.

WAREHOUSES

PROPOSED WORK

Idaho, Malad—Grain Warehousing Corp. soon takes bids grain warehouse. $30,000. M. Christensen, Malad, engr.

Ia., Sioux City—John Deere Plow Co., Moline, Ill., plans by O. A. Eckerman, c/o owner, warehouse, River Rd. and Jones St. $200,000. F. J. Farrington, 2218 North 56th St., Omaha, Neb., mgr.

Mo., Kansas City — Pittsburgh Plate Glass Co., 5th and Wyandotte Sts., revised plans by W. R. Boyard, 907 Orear Leslie Bldg., 1 story, 162 x 350 ft., brick, rein.-con., incl. office. To exceed $40,000.

O., Cleveland—Sun Oil Co., 3354 Independence Rd., sketches warehouse. To exceed $150,000. Private plans. Noted Mar. 20.

BIDS ASKED

Vt., White River Junction—Central Vermont R.R. Co., Inc., P. D. Fitzpatrick, ch. engr., St. Albans, subsidiary Canadian National Rys., taking bids altering and constructing freight house addition. $40,000. Private plans.

CONTRACTS AWARDED

California—Gilmore Oil Co. Ltd., 2423 East 28th St., Los Angeles, eight 2 story, brick, tile distributing warehouses on West Coast, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $150,000 each.

Idaho, Blackfoot—Grimm Growers Warehouse Corp., warehouse, to Anderson & Yancy, Blackfoot, $43,000.

Mass., Cambridge—Vacuum Oil Co., 61 Bway., New York, 1 story, basement, brick, concrete, steel warehouse addition, plain found., Potter St., to Turner Constr. Co., 178 Tremont St., Boston. Est. $40,000-$50,000.

Minn., Minneapolis—Caterpillar Tractor Co., 2037 University Ave. S.E., general contract 1 story, brick, steel, rein.-con., University Ave., to Austin Co., 510 North Dearborn St., Chicago, Ill. Est. $200,000.

N. J., Jersey City — Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, warehouse and Pier 8, Hudson River, to Fred Snare Co., 114 Liberty St., New York. Est. $2,000,000. Noted June 12.

N. J., Paterson—Armour & Co., 107 Hamilton Ave., 1 story, basement, brick, steel, separate contracts. $150,000. R. L. Clark, 930 East 26th St., archt. Noted June 19.

Ore., Portland—Gilmore Oil Co., Ltd., 2423 East 28th St., Los Angeles, Calif., 2 story, brick, steel distributing warehouse, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $150,000.

See proposal advertising on page 116

Constr. News page 303

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for standard-gage track

THE Keystone Steel Tie No. 17 is a heavy-duty, copper-bearing steel tie, for use at all locations where the life of wood ties is comparatively short. This steel tie holds the track true to gage and in alignment, preventing spreading or rolling over of the rails and consequent derailment.

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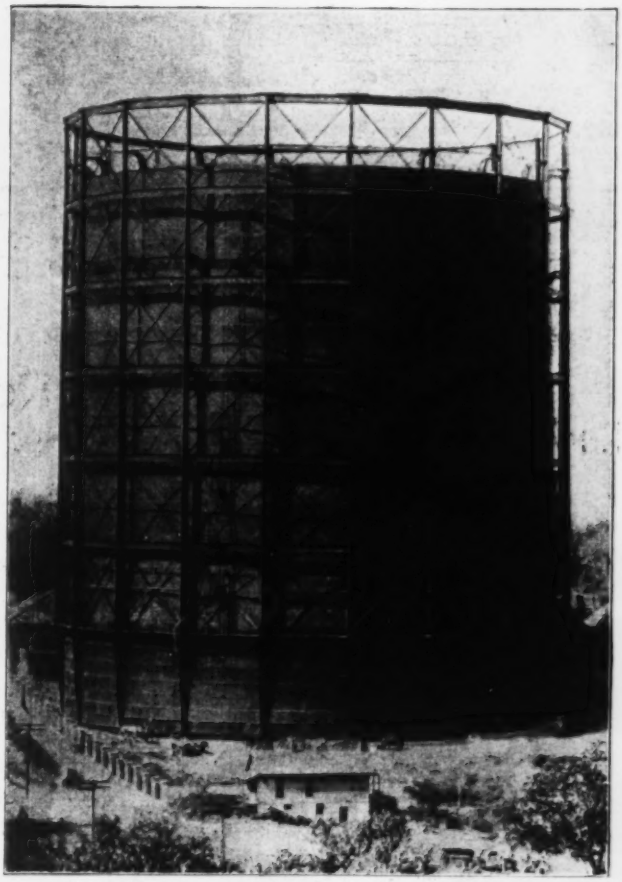

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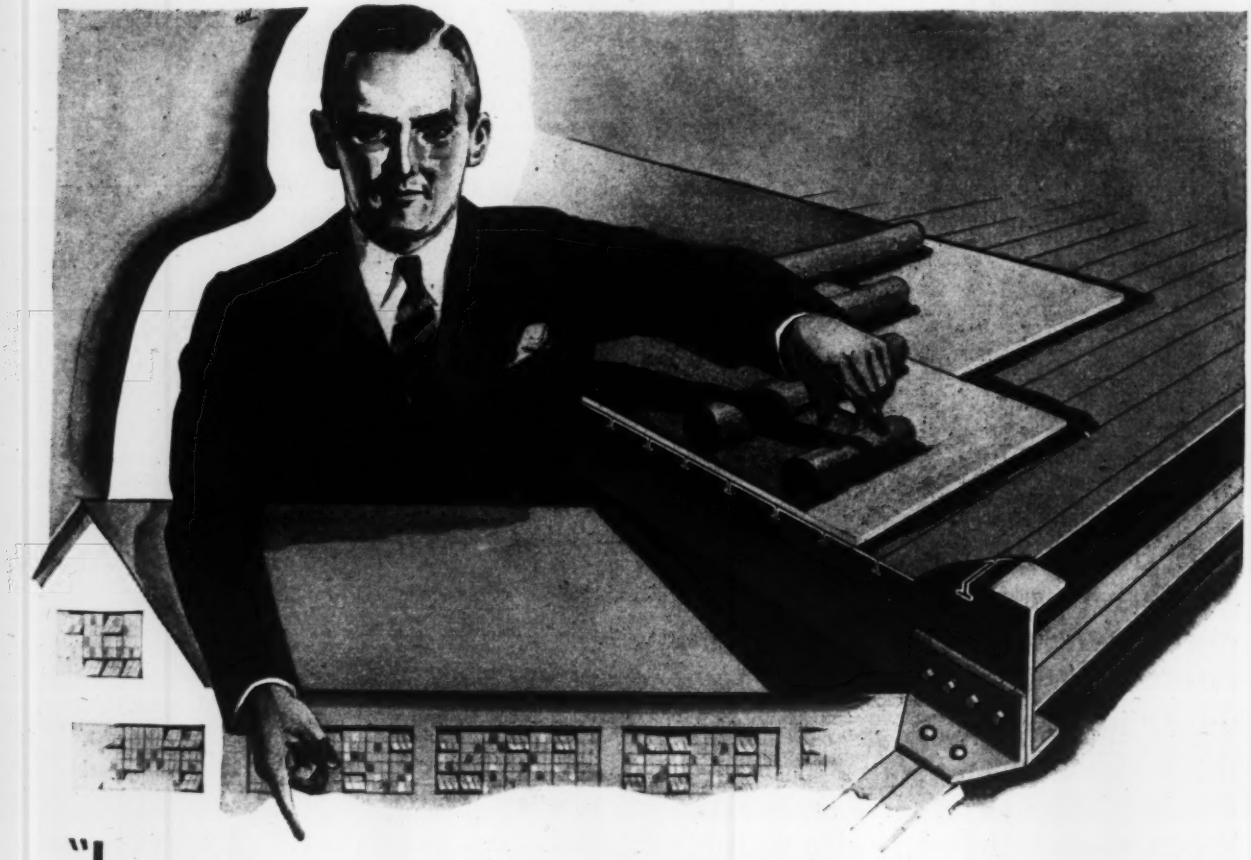

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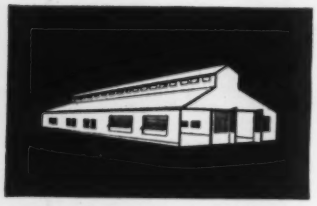

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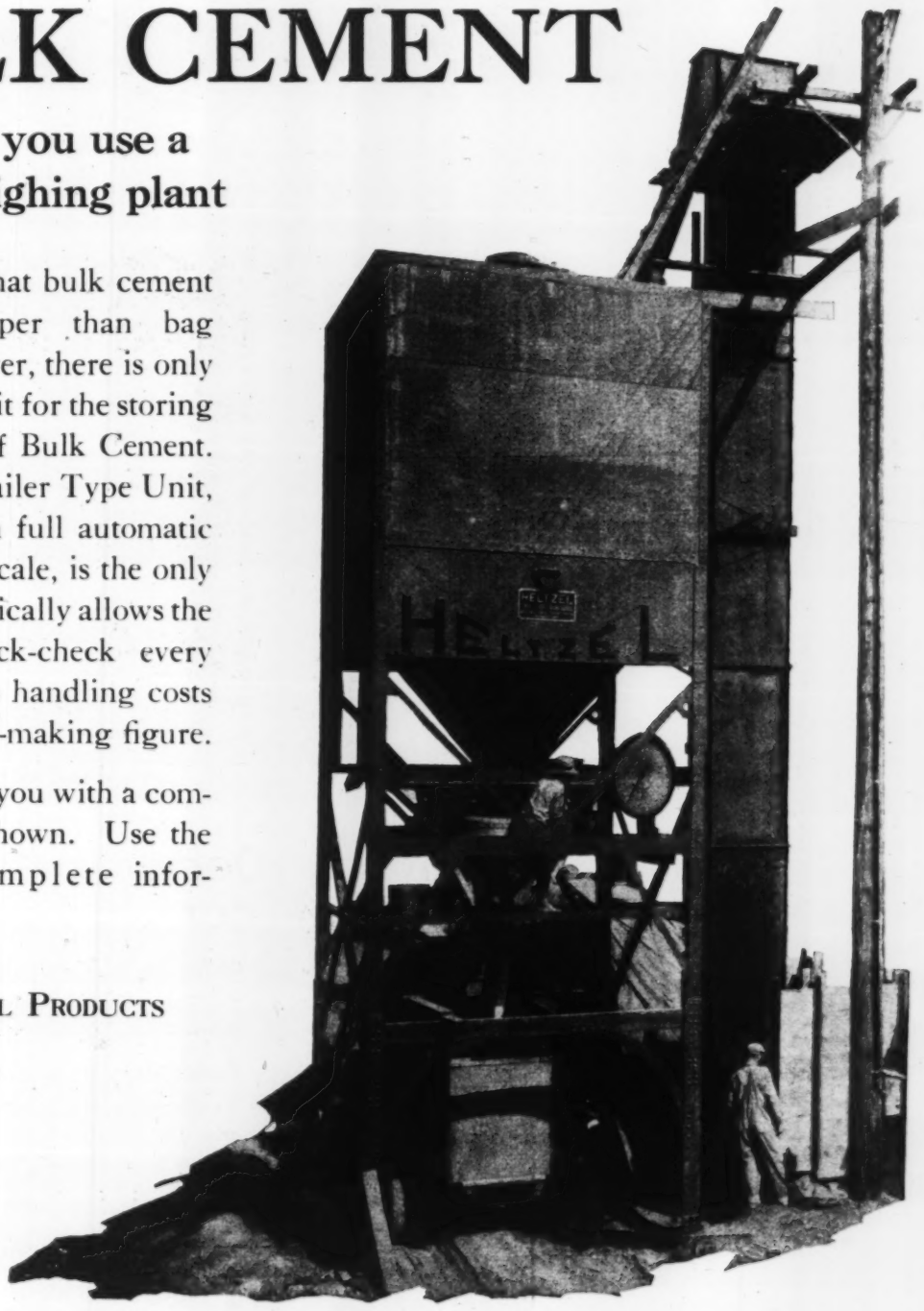

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A FORERUNNER

Architects: Allison & Allison, Los Angeles
Steel, fabrication, erection and welding: Consolidated Steel Corporation, Ltd., Los Angeles
Engineering: Southern California Edison Company, Ltd.

* * *

When preparing specifications for arc-welded buildings, remember that General Electric builds: single-operator sets for shop and field welding; multiple-operator and automatic sets for shop fabrication; automatic equipment for the new "battledeck"-type steel flooring; also welding electrodes, and complete welding accessories. You will find your nearest G-E office a dependable headquarters for advice, engineering assistance, and equipment.

THIS beautiful 13-story office building under construction in Los Angeles for the Southern California Edison Company, Ltd. is prophetic of the all-arc-welded skyscraper of tomorrow.

For, although riveted connections will carry the vertical loads, arc-welded connections will carry the seismic loads and windbracing throughout. The total amount of welding required to make the connections will approximate 50,000 feet of fillet welds, varying in size from ⅜ inch to 1½ inches. In addition, a number of butt welds will be made.

Arc-welded shop fabrication, begun on Jan. 18, was completed March 10. Field welding began almost immediately with a crew of twenty-three operators and was completed by June fourteen. In fact, the satisfactory manner in which the arc welding has progressed has been a revelation to even the most ardent proponents of arc-welded buildings.

In this pioneer undertaking, it has been General Electric's privilege to supply twenty of the arc-welding sets used in shop and field—and the vital task of supervising the welding operations has been intrusted to a General Electric engineer.

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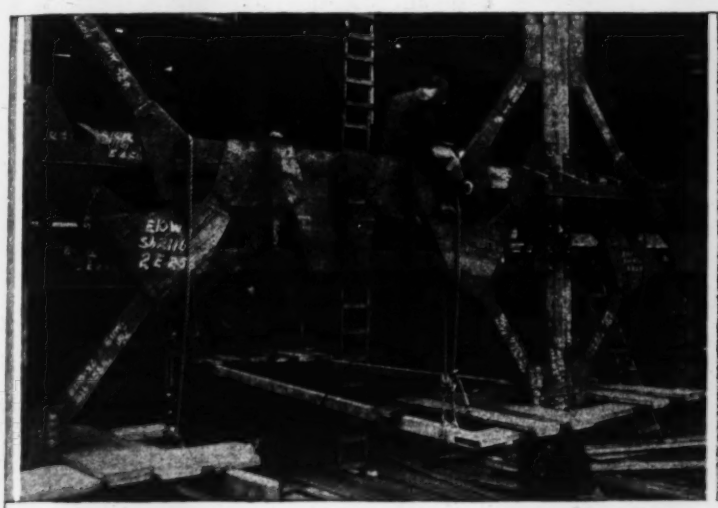
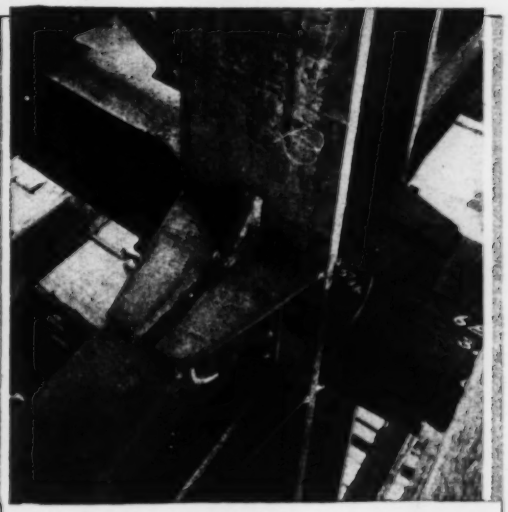
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

of the ARC-WELDED SKYSCRAPER

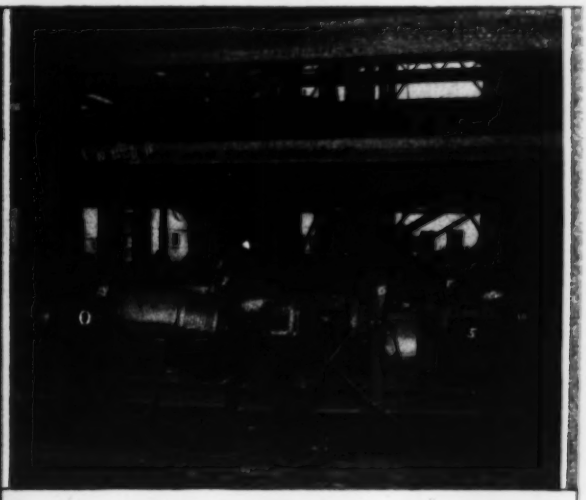


Welded spandrel trusses with vertical welded plates to carry masonry shelf angles



Beam-to-column connections, showing continuity plates

Making an overhead weld on a typical continuity plate



Some of the G-E welding sets on the mezzanine floor

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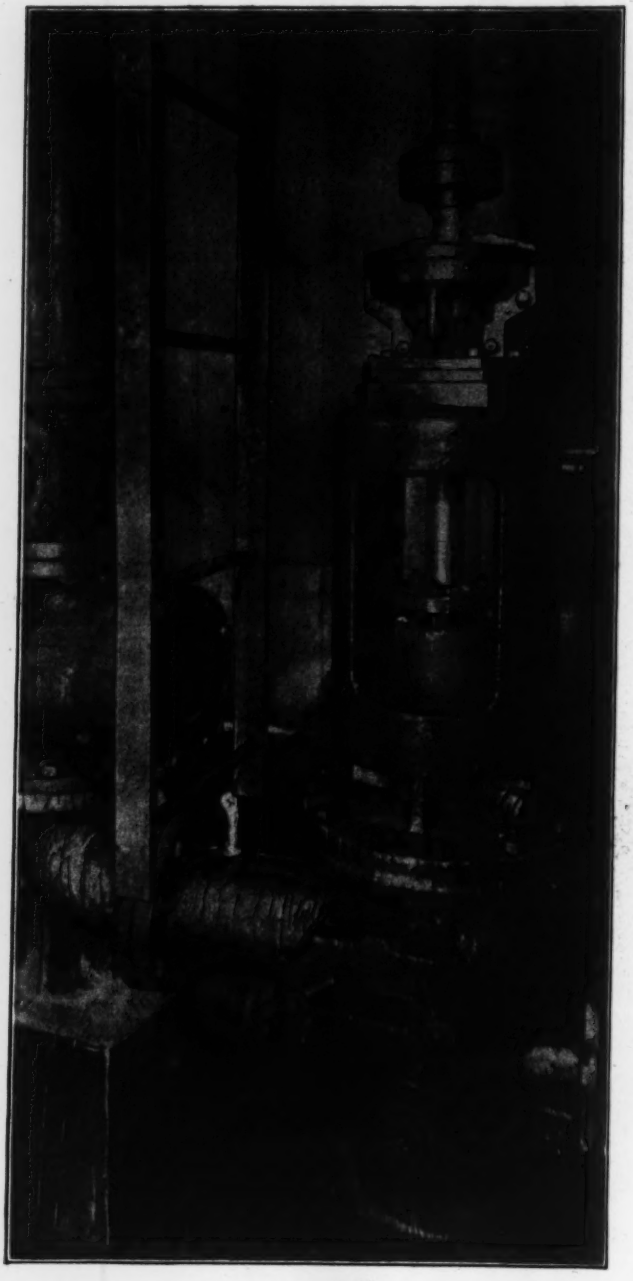

THIS is a sewage pump—unretouched, and every sewage man knows that this is the way these jobs look.

What we want to impress on you is this:

> We are sure that if you have occasion to examine a Buffalo Sewage Pump installation you will be "sold" on the merits of these pumps by the operator of the station.

Therefore—we ask that on the first opportunity you check up on our statements. Ask the operator if Buffalo Pumps are all that we claim for them.

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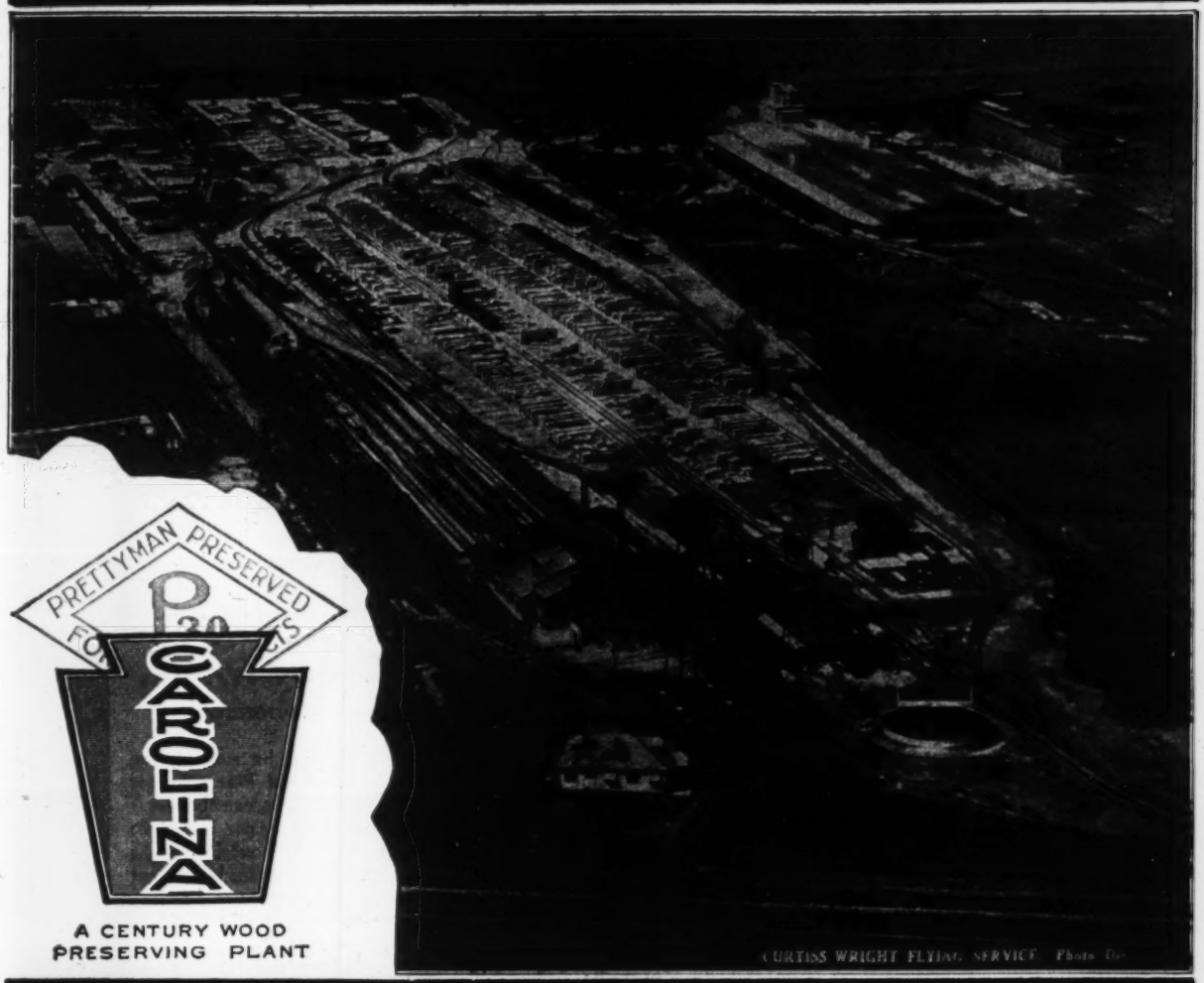

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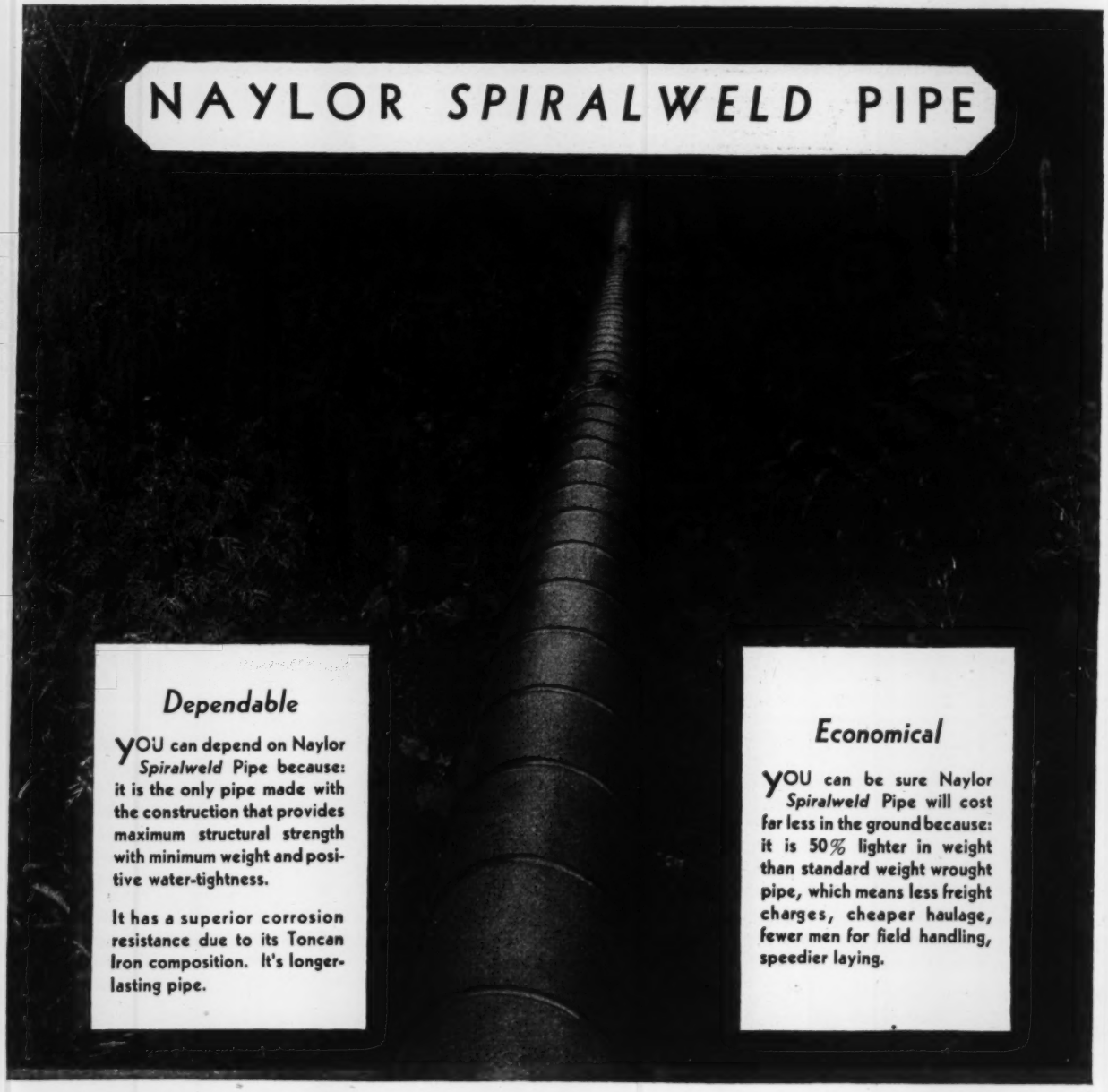
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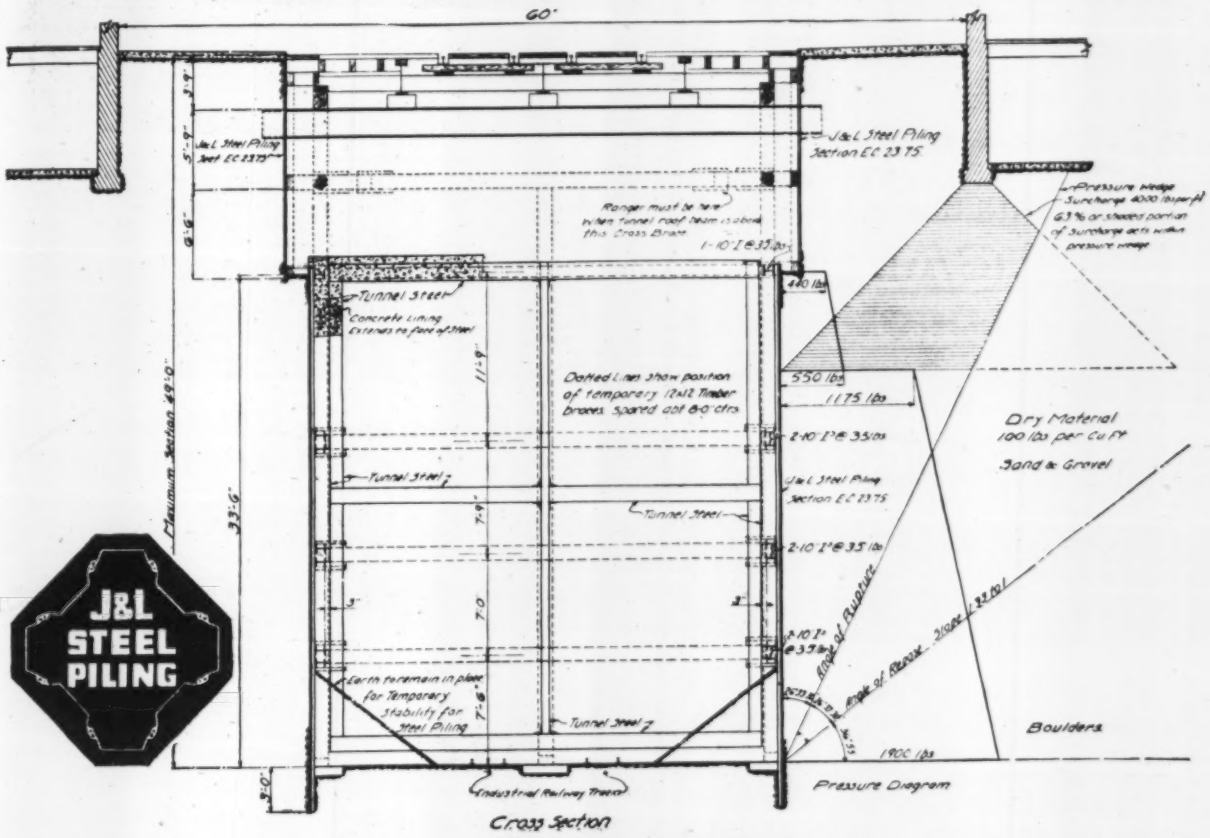

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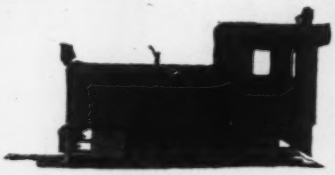

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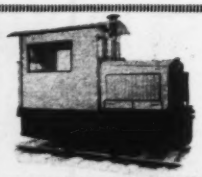

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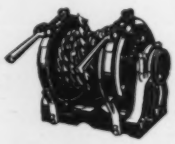

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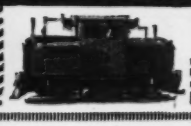

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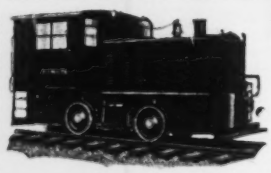

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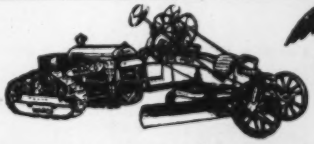

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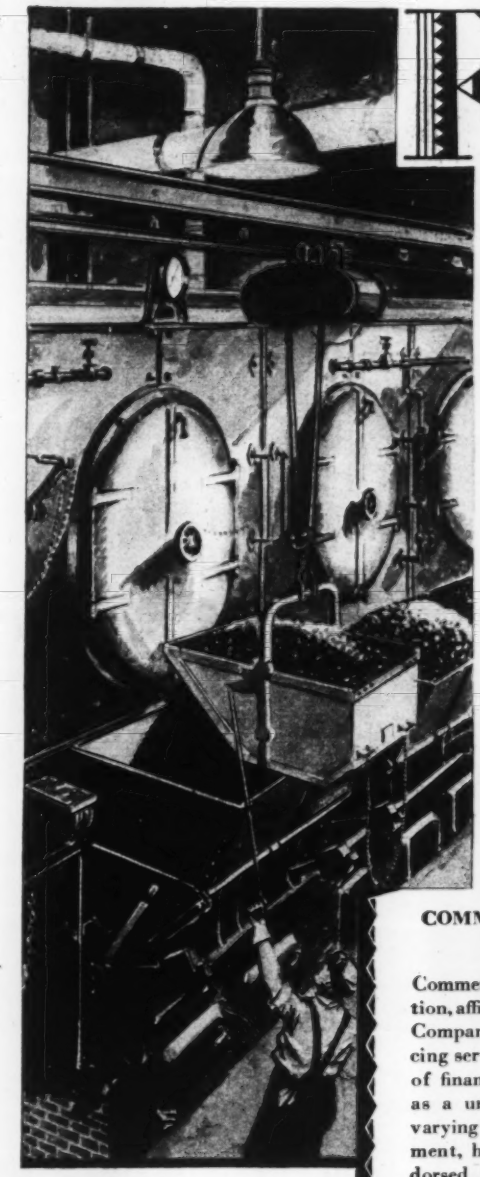

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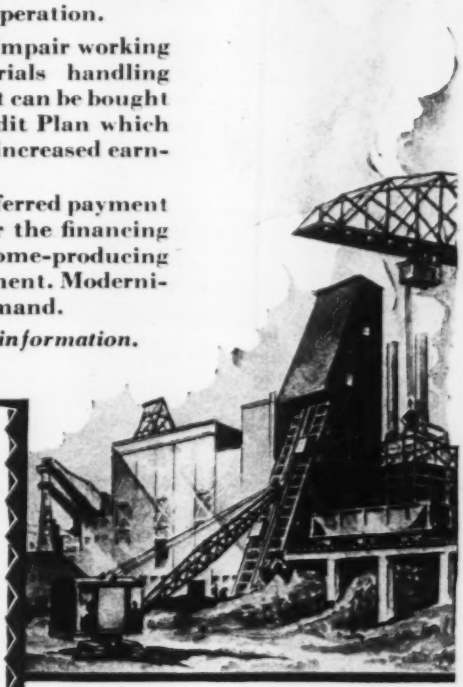

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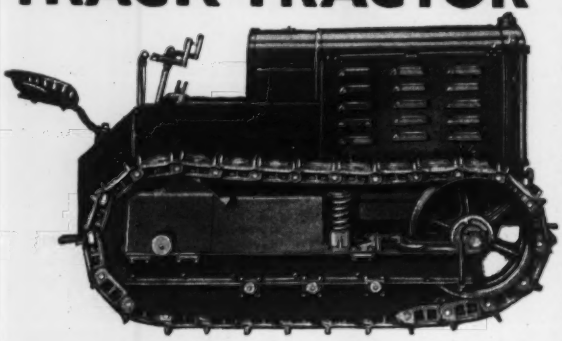

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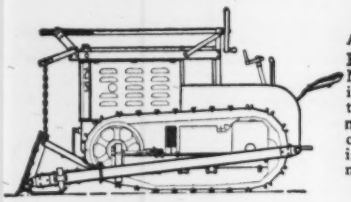

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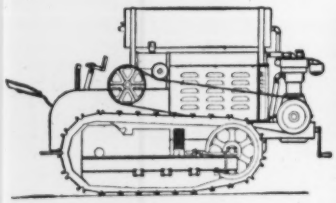

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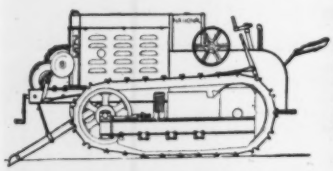

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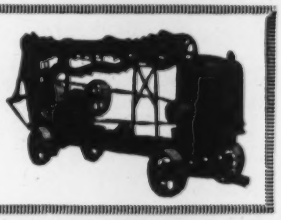

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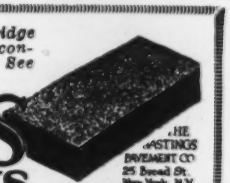

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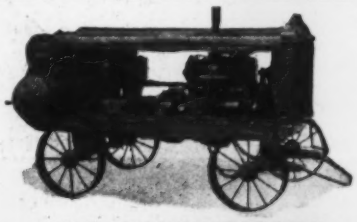

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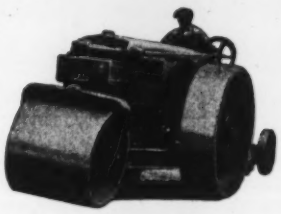

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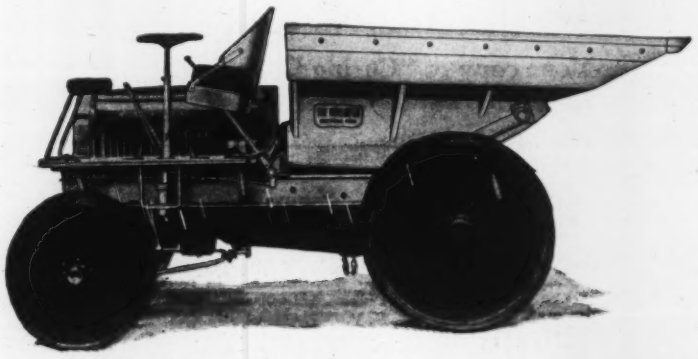

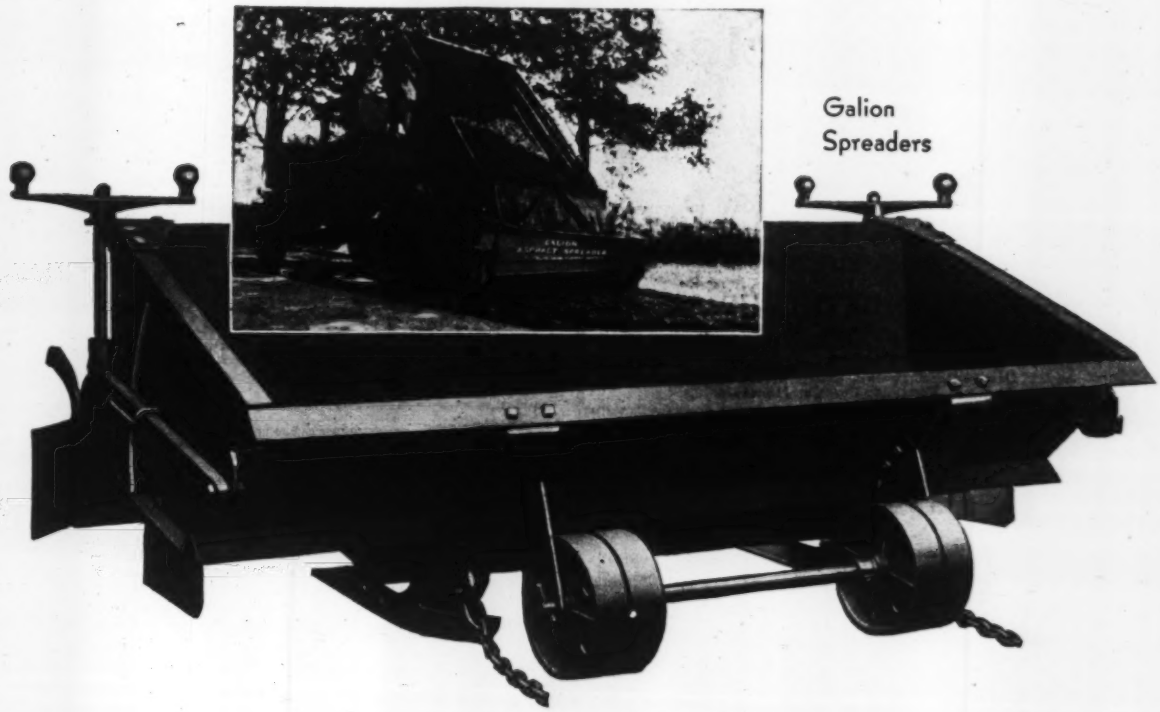

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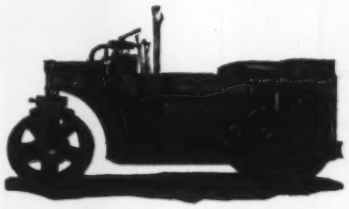

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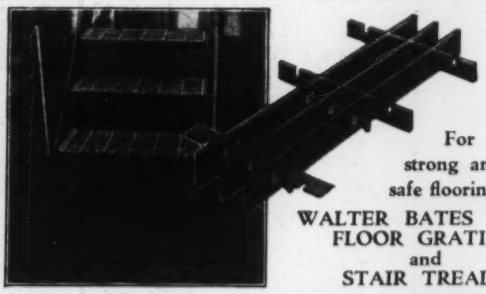

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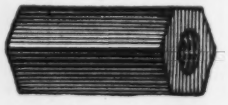

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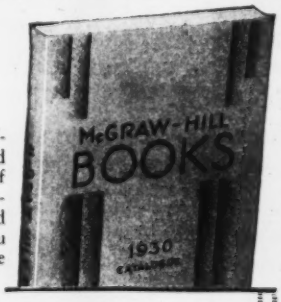

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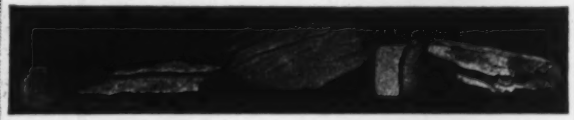

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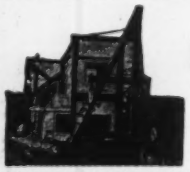

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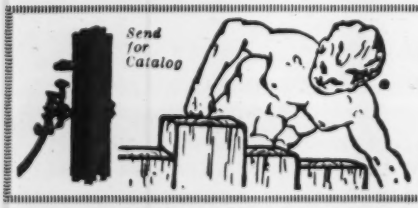

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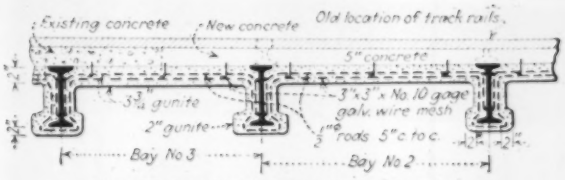

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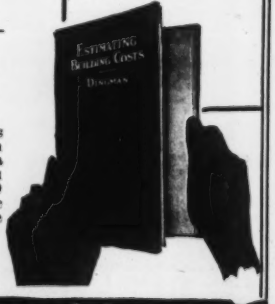

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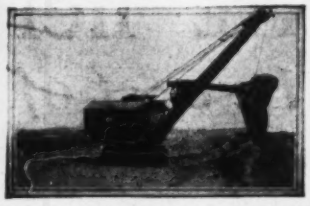

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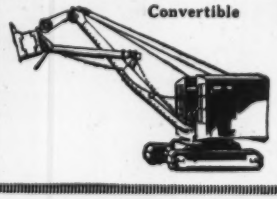

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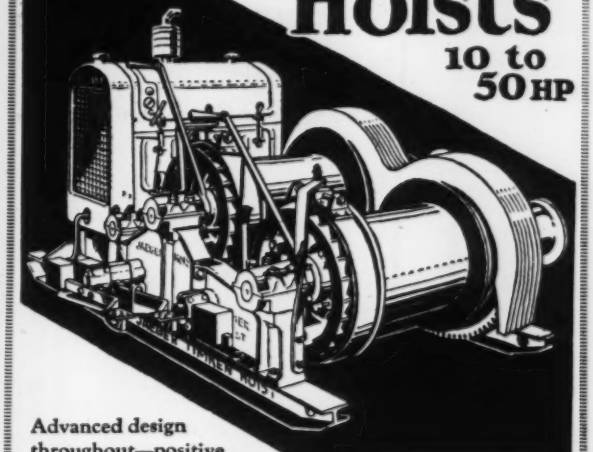

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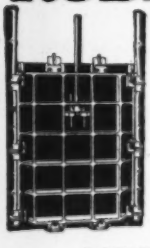

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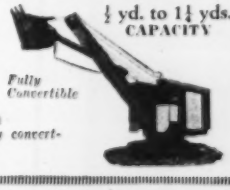

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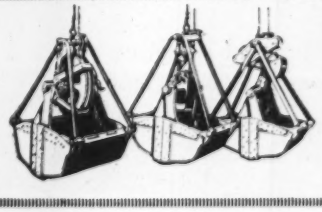

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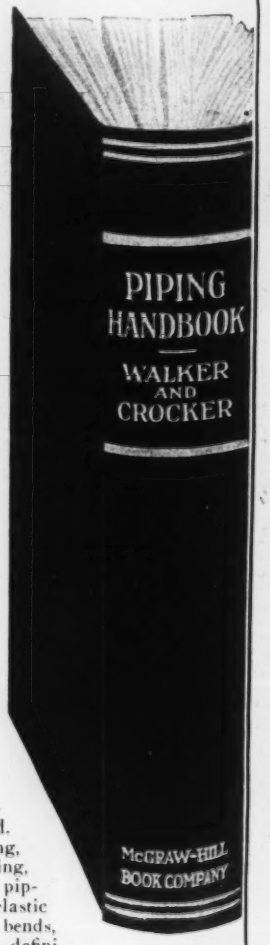

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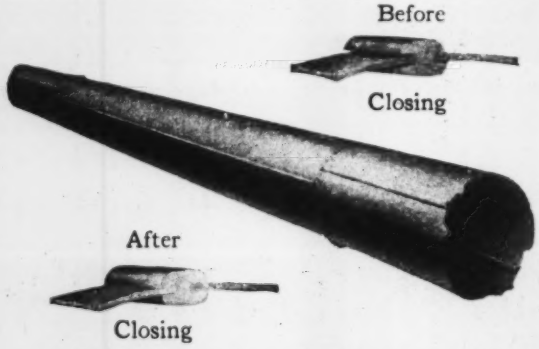

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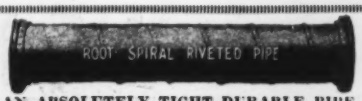

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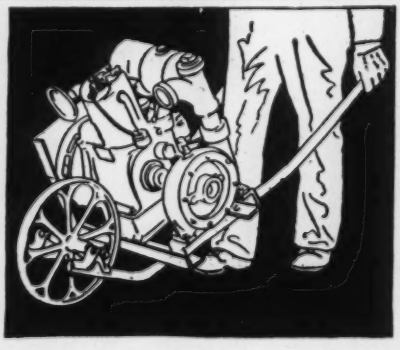

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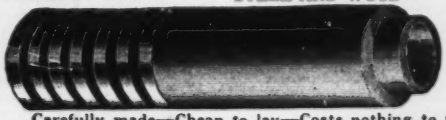

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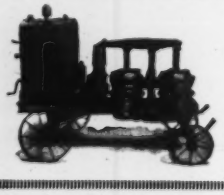

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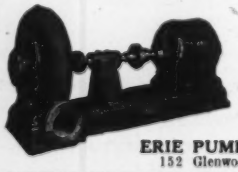

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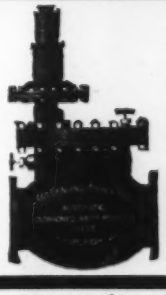

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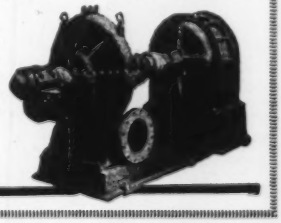

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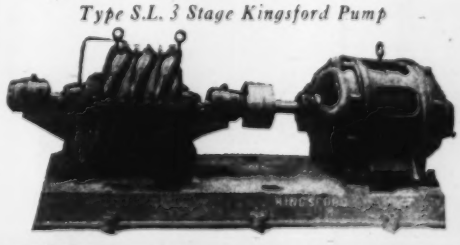

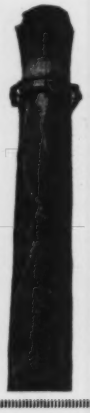

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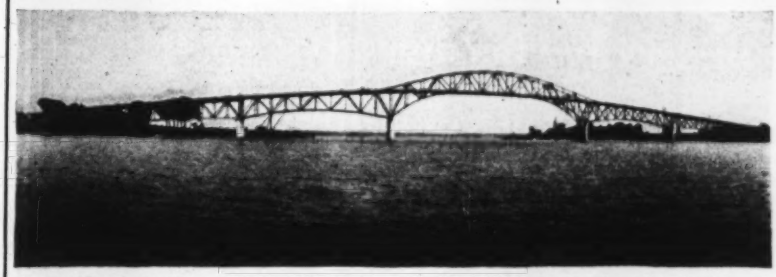

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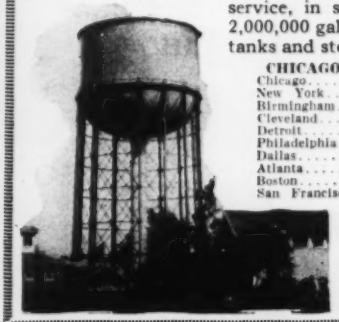

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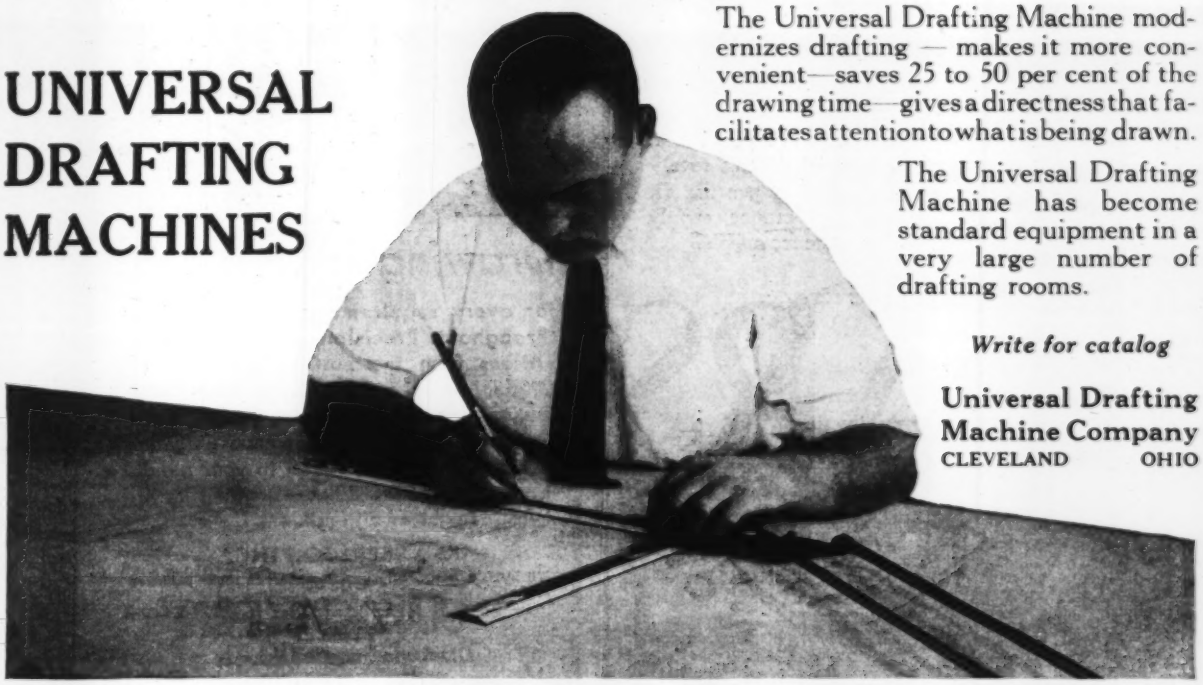

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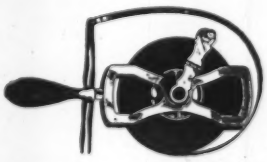

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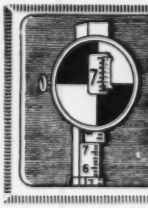

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E. N.-R.

OFFICIAL PROPOSALS

Bids: July 9.

Refrigeration Work

SPEC. NO. 5378

Amenia, N. Y.

Sealed proposals covering Refrigeration Work, D. F. Building (Kitchen and Dining Room) and S. B. Building (Bakery), Wassaic State School, Amenia, N. Y., in accordance with Specification No. 5378 and accompanying drawings, will be received by the Commissioner, Department of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Wednesday, July 9, 1930. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such drawings and specifications.

WALTER E. HUTCHINS,
Asst. Secretary.

DATED: June 3, 1930.

Bids: July 8.

Grading and Paving

WESTCHESTER COUNTY PARK COMMISSION
CONTRACT NO. 325

Mount Pleasant, N. Y.

Sealed bids for the Grading and Paving of the Driveways at State Police Barracks, located in the Town of Mount Pleasant, Westchester County, N. Y., will be received at the office of the Westchester County Park Commission, 72 West Pondfield Road, Bronxville, N. Y., until 11:30 a.m., Daylight Saving Time, July 8, 1930, when the bids received will be publicly opened and read.

The principal items are:

Excavation	4,900 cu.yds.
Pipe	1,230 lin.ft.
Sod Gutter	2,000 sq.yds.
Inlets	21 inlets
Creosoted Plank Edging	6,400 lin.ft.
Bituminous Macadam Pavement (Penetration Method) for Roadway	7,000 sq.yds.
Cinder and Screenings Paving	600 sq.yds.

Pamphlets containing information for bidders, form of proposal, contract drawings and specifications may be obtained by intending bidders at the above address by depositing $5.00 for same.

The right is reserved to reject any or all bids.

WESTCHESTER COUNTY PARK COMMISSION
By JAY DOWNER, Chief Engineer.

Dated: June 17th, 1930.
Bronxville, New York.

OFFICIAL PROPOSALS

Bids: July 16.

Gutters, Etc.

NEWARK STATE SCHOOL
Newark, Wayne County, N. Y.

Sealed proposals for constructing gutters, etc., at the Newark State School, Newark, Wayne County, N. Y., will be received at the office of the Department of Mental Hygiene, State Office Building, Albany, N. Y., at 3 p.m., Daylight Saving Time, Wednesday, July 16th, 1930, when they will be publicly opened and read. Proposals shall be endorsed on the envelope, "Proposal for Constructing Gutters, Etc., Newark State School, Newark, Wayne County, New York" and addressed to the Department of Mental Hygiene, State Office Building, Albany, N. Y., and shall be accompanied by a deposit consisting of a certified check drawn upon some legally incorporated bank in this State and made payable at sight to the State of New York, or money, for not less than Five per cent (5%) of the amount of the proposal. The contractor to whom award is made will be required to furnish for the faithful performance of the work a surety bond in amount of Fifty per cent (50%) of the amount of the contract. The right is reserved to reject any and all bids. Specifications and plans for this contract may be examined at the office of the Department of Mental Hygiene, State Office Building, Albany, N. Y., at the office of the Chief Engineer, Department of Public Works, Division of Engineering, State Office Building, Albany, N. Y., at the office of the District Engineer, Department of Public Works, Syracuse, N. Y., and at the office of the Superintendent of the Newark State School, Newark, N. Y. Plans and specifications for this contract will be furnished by the Chief Engineer, Department of Public Works, Division of Engineering, upon payment of $.70. No refund will be made for plans returned. The estimated cost of this project is $2,862.00.

DEPARTMENT OF MENTAL HYGIENE,
F. W. PARSONS, Commissioner.

Bids: July 15.

Furnishing and Delivering Shaft Caps, Etc.

CONTRACT 236

New York City.

Sealed bids will be received by the Board of Water Supply, at its offices, eleventh floor, 346 Broadway, New York City, until 10 a.m., Eastern Standard Time, on Tuesday, July 15, 1930, for Contract 236, for furnishing and delivering ten 48 by 36 by 36-inch, one 48 by 36-inch and twenty-two 72 by 48 by 48-inch shaft caps and appurtenances for City Tunnel No. 2, all as set forth in the specifications. At the above place and time the bids will be publicly opened and read. Pamphlets containing information for bidders, forms of bid and contract, specifications, contract drawings, etc., can be obtained at the office of the Secretary at the above address, by depositing the sum of five dollars ($5) in cash or its equivalent for each pamphlet. For further particulars apply to the office of the Chief Engineer at the above address.

GEORGE J. GILLESPIE, President.
PHILIP F. DONOHUE, WILLIAM F. DELANEY, Commissioners, Board of Water Supply; BENJ. F. EINBIGLER, Secretary.

OFFICIAL PROPOSALS

Bids: July 9.

Bakery Ovens and Machinery

SPEC. NO. 5997

Kings Park, N. Y.

Sealed proposals covering Bakery Ovens and Machinery, Present Bakery Building, Kings Park State Hospital, Kings Park, L. I., N. Y., in accordance with Specification No. 5997 and accompanying drawings, will be received by the Commissioner, Department of Mental Hygiene, 18th floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Wednesday, July 9, 1930. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th floor, State Office Building, Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Kings Park State Hospital, Kings Park, L. I., N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such drawings and specifications.

DATED: June 2, 1930.

Bids: July 1.

Plumbing and Heating Systems

WESTCHESTER COUNTY PARK COMMISSION
CONTRACT NO. 307-P

Westchester Co., N. Y.

Sealed bids for the installation of the Plumbing and Heating Systems for the Polic and Comfort Station and Sprain Lake Service Building, located on the Saw Mill River Parkway & Sprain Lake Golf Course, in the Town of Greenburgh, and City of Yonkers, Westchester County, N. Y., will be received at the office of the Westchester County Park Commission, 72 West Pondfield Road, Bronxville, N. Y., until 11:30 a.m., July 1, 1930, when the bids received will be publicly opened and read.

Pamphlets containing information for bidders, form of proposal, contract drawings and specifications may be obtained by intending bidders at the above address by depositing $5.00 for same.

The right is reserved to reject any or all bids.

By WESTCHESTER COUNTY PARK COMMISSION
JAY DOWNER,
Chief Engineer.

Dated: June 12, 1930.
Bronxville, N. Y.

OFFICIAL PROPOSALS

Bids: July 8.

Bridges

THE ESSEX COUNTY PARK COMMISSION

Newark, N. J.

Sealed proposals for the construction of two reinforced concrete bridges, and approximately 6,000 lineal feet of concrete revetment walls will be received at the office of the Chief Engineer of The Essex County Park Commission, 115 Clifton Avenue, Newark, N. J., on July 8, 1930, at 2:30 p.m. Daylight Saving Time. After receipt of the proposals the same will be publicly opened.

Proposals must be submitted on the blank form furnished by the Chief Engineer, endorsed with the name of the bidder and enclosed in a sealed envelope furnished for that purpose.

Plans, specifications and form of contract may be examined at the office of the Chief Engineer or the Consulting Engineer, A. Burton Cohen, 1 Madison Avenue, New York City, and may be obtained from the Chief Engineer of the Commission, as provided for in INFORMATION TO BIDDERS, upon the deposit of a certified check payable to The Essex County Park Commission in the sum of $100.00.

A certified check drawn on a National or State Bank or Trust Company, payable to The Essex County Park Commission without any condition endorsed thereon, in the sum of $25,000.00 must accompany each proposal and shall be forfeited by the successful bidder unless he enters into the contract should the same be awarded to him.

The especial attention of bidders is directed to INFORMATION TO BIDDERS made a part of the contract agreement.

The successful bidder will be required to furnish a bond in the form required by the Park Commission for the full amount of the contract.

The Essex County Park Commission reserves the right to waive any informality in the proposals received, to reject any or all bids and retains the right to accept any bid which in its judgment is for the best interest of the Commission.

THE ESSEX COUNTY PARK COMMISSION,
DAVID I. KELLY, Secretary.

Bids: July 9.

Electric Elevators & Dumbwaiter

SPEC. NO. 5581

Buffalo, N. Y.

Sealed proposals covering Electric Elevators and Dumbwaiter, Reception Building, Buffalo State Hospital, Buffalo, N. Y., in accordance with Specification No. 5581 and accompanying drawings, will be received by the Commissioner, Department of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Wednesday, July 9, 1930.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Buffalo State Hospital, Buffalo, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such drawings and specifications.
DATED: June 2, 1930.

OFFICIAL PROPOSALS

Bids: July 8.

Soot Blowers

SPEC. NO. 6006

Albany, N. Y.

Sealed proposals covering Heating Work for Soot Blowers, Capitol Power House, Albany, N. Y., in accordance with Specification No. 6006 will be received by the Superintendent of Public Buildings, Department of Public Works, Capitol, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Tuesday, July 8, 1930. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Bldg., Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Bldg., Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.

Proposal blanks and envelopes may be obtained and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of Two Dollars and Fifty Cents ($2.50).

There will be no return of the money paid for such specifications.
DATED: June 9, 1930.

Bids: June 30.

Paving

Beacon, N. Y.

Sealed proposals for the paving of Verplanck Avenue, Wolcott Avenue from Tioronda Avenue westerly to Beekman Street, Spring Valley Street, Mill Street, and East Main Street from Liberty Street to the junction of Spring Street and Washington Avenue (approximately 2.8 miles), with a permanent pavement of the Portland Cement reinforced concrete type, will be received by the Council of the City of Beacon, Dutchess County, New York, at the City Offices, 525 Main St., Beacon, New York, until 2:30 o'clock p.m., Daylight Saving Time, Monday, June 30, 1930, at which time and place the proposals received will be publicly opened and read.

Plans and specifications may be obtained from the Commissioner of Accounts of the City of Beacon, New York, or at the office of the Consulting Engineers, in the Odd Fellows' Building, 537-539 Main Street, Beacon, New York, by depositing $10.00, which will be refunded upon the return of the plans and specifications in good order within thirty days of reception of bids.

Each proposal must be accompanied by a certified check payable to the order of the City of Beacon for five (5) per cent of the amount of the proposal.

The City of Beacon reserves the right to reject any or all bids.

Dated, Beacon New York, June 11, 1930.
ROBERT A. NERRIE,
Commissioner of Accounts
of the City of Beacon, New York.

Bids: July 14.

Drainage

Akron, Ohio.

Sealed proposals will be received by the Auditor of Summit County, Ohio, at his office in the Court House, Akron, Ohio, until 1:00 o'clock p.m., Eastern Standard Time, Monday, July 14th, 1930, for the construction of Wolf Creek Drainage No. 32, as follows:

Proposal No. 1, Dredging 551,000 cubic yards, repairing bridges and culverts, construction of dyke, sump and pump house.

Proposal No. 2, Construction of storm sewers and lowering sewers and water lines.

A certified check on some solvent bank in the sum of 3% of the total amount of bid is required with each proposal.

Proposal forms, plans and specifications can be obtained from the County Surveyor, Akron, Ohio, upon a deposit of $15.

The right is reserved to reject any or all bids.

By order of the Board of County Commissioners, Summit County, Ohio.
H. G. SOURS, County Surveyor.

OFFICIAL PROPOSALS

Bids: July 8.

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS—DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p.m. advanced standard time which is twelve o'clock noon eastern standard time, on Tuesday, July 8, 1930, for the construction of highways in the following counties:

	Deposit Required
CATTARAUGUS (One highway: 6.53 miles)	$19,000.00
RENSSELAER AND WASHINGTON (One highway: 7.98 miles)	20,000.00
SCHENECTADY (One highway: 3.33 miles) Also for the reconstruction of the following:	9,000.00
COLUMBIA (One contract: 4.60 miles)	15,000.00
MONROE (Bridge contract: 0.36 mile)	8,000.00
ORANGE (One contract: 5.83 miles)	25,000.00
RENSSELAER (One contract: 3.54 miles)	19,000.00
ROCKLAND (One contract: 2.60 miles)	11,000.00
SCHENECTADY AND MONTGOMERY (One contract: 9.04 miles)	34,000.00
TIOGA (Bridge contract: 1.19 miles)	9,000.00
ULSTER (Two contracts: 3.39 & 4.09 miles)	$16,000.00 & 18,000.00

Maps, plans, specifications, and estimates may be seen and proposal forms obtained at the office of the Department in Albany, N. Y., and also at the office of the District Engineers in whose districts the roads are located. The addresses of the District Engineers and the counties in which they are in charge will be furnished upon request.

The especial attention of bidders is called to "General Information for Bidders" in the itemized proposal, specifications, and contract agreement.

A. W. BRANDT,
Commissioner of Highways.

Bids: July 9.

Electric Work

SPEC. NO. 5574

Newark, N. Y.

Sealed proposals covering Electric Work underground Service Connections, Newark State School, Newark, N. Y., in accordance with Specification No. 5574 and accompanying drawings, will be received by the Commissioner, Department of Mental Hygiene, 18th floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Wednesday, July 9, 1930. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th floor, State Office Building, Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Newark State School, Newark, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such drawings and specifications.
DATED: June 3, 1930.

OFFICIAL PROPOSALS

Bids: July 9.

Electric Dumbwaiters

SPEC. NO. 5968

Brooklyn, N. Y.

Sealed proposals covering Electric Dumbwaiters, Kitchen Wing, BROOKLYN STATE HOSPITAL, BROOKLYN, N. Y., in accordance with Specification No. 5968 will be received by the Commissioner, Department of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Wednesday, July 9, 1930.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Bldg., Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Brooklyn State Hospital, Brooklyn, N. Y.

Proposal blanks and envelopes may be obtained and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such specifications.

DATED: May 24, 1930.

Bids: July 7.

State Road Work

Hartford, Conn.

SEALED PROPOSALS will be received by the State Highway Commissioner, 12 Washington Street, Hartford, Conn., until 1:00 p.m., Eastern Standard Time, Monday, July 7, 1930, for the following sections of state work in accordance with plans and specifications on file at the following places:

TOWNS OF CORNWALL & SHARON: About 6,273 ft. of W-B. Macadam on the approaches to Cornwall Bridge. Note: Plans and proposal forms in the office of Geo. E. Smith, Division Engineer, Bank Bldg., New Milford, Conn. State will furnish reinf. conc. pipe.

TOWN OF DARIEN: About 2,644 ft. of bit. macadam on the Middlesex Road. Note: Plans and proposal forms in office of A. W. Bushell, Division Engineer, 30 Whitney Ave., New Haven, Conn. State will furnish R. C. pipe and Bit. material.

TOWN OF EASTFORD: About 8,510 ft. of waterbound macadam on the North Ashford-Kenyonville Road. Note: Plans and proposals forms in office of John Smith, Division Engineer, Thayer Bldg., Norwich, Conn. State will furnish Bit. Coated Corr. Metal Pipe.

TOWNS OF EAST HADDAM & HADDAM: A 3 span 215 ft. Encased girder bridge over Salmon River on the Haddam Neck-Haddam Road. Note: Plans and proposal forms in office of D. H. B. Starr, Div. Engineer, Poliner Bldg., Middletown, Conn. State will furnish cement.

TOWN OF EAST HARTFORD: A 65 ft. Triple Box reinforced concrete bridge and approaches over Hockanum River on Route No. 17. Note: Plans and proposal forms in office of R. W. Stevens, Division Engineer, 15 Lewis St., Hartford, Conn., State will furnish cement.

TOWN OF KENT: A 30 ft. span encased girder bridge and about 1,327 ft. of concrete at the Canal crossing at Bull's Bridge. Note: Plans and proposal forms in office of G. E. Smith, Division Engineer, Bank Bldg., New Milford, Conn. State will furnish reinf. conc. pipe and cement.

TOWN OF LISBON: about 25,589 ft. of concrete on Route 12. Note: Plans and proposal forms in office of John Smith, Division Engineer, Thayler Bldg., Norwich, Conn. State will furnish cement and reinf. conc. pipe.

OFFICIAL PROPOSALS

TOWNS OF MANCHESTER & VERNON: About 29,100 ft. of concrete on the Manchester-Rockville Road: Note: Plans and proposal forms in office of R. W. Stevens, Division Engineer, 15 Lewis Street, Hartford, Conn. State will furnish cement and reinf. conc. pipe.

TOWN OF MERIDEN: A 62 ft. steel I-Beam Overpass on No. Broad St. Note: Plans and proposal forms in office of D. H. B. Starr, Division Engineer, Poliner Bldg., Middletown, Conn. State will furnish cement.

TOWNS OF MIDDLEBURY & WOODBURY: About 20,240 ft. of concrete on the Ben Sherman Hill Road: Note: Plans and proposal forms in office of G. E. Smith, Division Engineer, Bank Building, New Milford, Conn. State will furnish cement, R. C. Pipe and Bit. material for joints.

TOWN OF NEW CANAAN: About 1,816 ft. of concrete on the Smith Ridge Road. Note: Plans and proposal forms in the office of A. W. Bushell, Division Engineer, 30 Whitney Avenue, New Haven, Conn. State will furnish cement and R. C. Pipe.

TOWN OF NEW MILFORD: About 7,257 ft. of W-B. macadam on the Merryall Road: Note: Plans and proposal forms in office of Geo. E. Smith, Div. Engr., Bank Bldg., New Milford, Conn. State will furnish Reinf. conc. pipe.

TOWN OF SOUTH WINDSOR: About 20,048 ft. of T. R. W-B. Macadam on East St. Note: Plans and proposal forms in office of R. W. Stevens, Division Engineer, 15 Lewis Street, Hartford, Conn. State will furnish R. C. Pipe and Cement.

TOWN OF WEST HAVEN: About 626 ft. of widening existing concrete on Derby Avenue, at Yale Field. Note: Plans and proposal forms in office of A. W. Bushell, Division Engineer, 30 Whitney Ave., New Haven, Conn. State will furnish cement.

TOWN OF WINCHESTER: About 11,633 ft. of waterbound macadam on Torringford St. Note: Plans and proposal forms in office of D. C. Loewe, Division Engineer, Winsted, Conn. State will furnish Bit. Coated Corr. Metal Pipe.

All bids must be accompanied by a surety company bond or a certified check not less than one-third of the cost of the work. The State Highway Commissioner reserves the right to reject any and all bids.

Dated at Hartford, Connecticut, June 20, 1930.

JOHN A. MacDONALD,
State Highway Commissioner,
12 Washington Street, Hartford, Conn.

Bids: July 8.

Sewer and Appurtenances

Ludlow, Massachusetts.

Sealed proposals for constructing Sewer and Appurtenances will be received by the Board of Sewer Commissioners at the Town Office, 16 Chestnut Street, Ludlow, Mass., up to 5:00 p.m., Daylight Saving Time on Tuesday, July 8, 1930, when they will be publicly opened and read. Each proposal must be accompanied by a certified check for the sum of $2,000.00 payable to the Town Treasurer of Ludlow, Mass.

CONSTRUCTION of approximately 3¾ miles of trunk and lateral sewers with all appurtenances, principally located in the northeast section of the village proper, Town of Ludlow, extending easterly from Sewall Street to Amherst Street.

PLANS AND SPECIFICATIONS: Information for Contractors, forms for proposal, contract, and Bond may be seen at the Town Office on and after June 26, 1930. Proposal blanks, general layout plan and specifications may be purchased by general or subcontractors from the Sewer Commission Engineer, 16 Chestnut Street, Ludlow, Mass., upon payment of $6.00 and profiles upon payment of $14.00.

There will be no return of the money paid for such plans and specifications or profiles.

The Sewer Commissioners reserve the right to reject any or all proposals or to accept any proposal which may be deemed to be to the best interest of the Town of Ludlow.

BOARD OF SEWER COMMISSIONERS:
WALTER A. SEDELOW, Chairman.
M. E. CHAPMAN.
ROBERT L. NICOL.

PAUL L. WOOD, Engineer.
Dated: June 23, 1930.

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Craftsweld Equipment Corporation
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OFFICIAL PROPOSALS

Bids: July 14.

Construction of a Ramp

New York City.

Sealed proposals for the construction of the main approach ramp of the New York Approach to the Hudson River Bridge between Fort Washington, New York, and Fort Lee, New Jersey, will be received at the office of the General Manager of the Port Authority until 11 o'clock Daylight Saving Time, on the morning of Monday, July 14, 1930, and then publicly opened.

The ramp has a length of about 980 feet, extending eastward from the anchorage in Fort Washington Park. It consists of (1) a 196 ft. reinforced concrete arch, (2) a structural steel and reinforced concrete structure about 500 ft. long, and (3) an open cut about 200 ft. long. The work involves, in addition to the ramp, street construction in 178th Street and 179th Street, and reconstruction of sewers, water mains and other utilities.

A more complete description of the work and full information for bidders is given in the drawings and other contract papers, which may be seen at the office of the

CHIEF ENGINEER
THE PORT OF NEW YORK AUTHORITY
80-90 EIGHTH AVENUE
NEW YORK CITY

Complete copies of the foregoing papers will be furnished upon deposit of $25.00. The deposit will be remitted if the papers are returned in good condition not later than thirty days after the opening of bids.

New York, June 19, 1930.

THE PORT OF NEW YORK AUTHORITY,
JOHN F. CALVIN,
Chairman.

Bids: July 9.

Fine Grading and Paving

WESTCHESTER COUNTY PARK COMMISSION
CONTRACT NO. 277

Westchester Co., N. Y.

Sealed bids for the Fine Grading and Paving of the Access Drives located on the Hutchinson River Parkway at North Avenue, Webster Avenue, Weaver Street and Mamaroneck Avenue, in the Cities of New Rochelle and White Plains and Towns of Scarsdale and Harrison, Westchester County, N. Y., will be received at the office of the Westchester County Park Commission, 72 West Pondfield Road, Bronxville, N. Y., until 11:30 a.m., Daylight Saving Time, July 9, 1930, when the bids received will be publicly opened and read.

The principal items are:

Fine grading	5,400 sq.yds.
Portland Cement	2,100 bbls.
Metal Reinforcement	50,000 lbs.
Cement Concrete Pavement (One Course)	1,300 cu.yds.

Pamphlets containing information for bidders, form of proposal, contract drawings and specifications may be obtained by intending bidders at the above address by depositing $5.00 for same.

The right is reserved to reject any or all bids.

BY WESTCHESTER COUNTY PARK COMMISSION
JAY DOWNER, Chief Engineer.

Dated: June 20th, 1930.
Bronxville, New York.

OFFICIAL PROPOSALS

Bids: July 16.

Automatic Fire Sprinklers

SPEC. NO. 5772

Utica, N. Y.

Sealed proposals covering Automatic Fire Sprinklers, Utica State Hospital, Utica, N. Y., in accordance with Specification No. 5772 and accompanying drawings will be received by the Commissioner, Department of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time), on Wednesday, July 16, 1930. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Bldg., Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Utica State Hospital, Utica, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of $2.50.

There will be no return of the money paid for such drawings and specifications.
Dated: June 11, 1930.

Bids: July 15.

Construction, Heating, Etc.

SPEC. NOS. 6033, 6034, 6035, & 6036

Ithaca, N. Y.

Separate sealed proposals covering Construction, Heating, Sanitary and Electric Work for Greenhouses, Cornell University, Ithaca, N. Y., in accordance with Specifications Nos. 6033, 6034, 6035 and 6036 and accompanying drawings, will be received by The Commissioner of Education, State Education Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time), on Tuesday, July 15, 1930.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 949 Broadway, New York City.
Commissioner of Architecture, 11th Floor, State Office Bldg., Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, Barge Canal Terminal, Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Cornell University, Ithaca, N. Y.

Proposal blanks, envelopes, drawings and specifications may be obtained from The Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y.
Dated: June 10, 1930.

Bids: July 7.

Trunk Sewer

Chesterton, Indiana.

Sealed bids will be received by Board of Trustees of the Town of Chesterton, Indiana, Monday, July 7, 1930, at 1 p.m. Central Standard Time, for construction of main trunk sewer. Estimated cost $153,842.50. Plans and specifications may be obtained from Chas. W. Cole, Engineer, of South Bend, Indiana. CARL G. NORDSTROM, Town Clerk, Chesterton, Indiana.

OFFICIAL PROPOSALS

Bids: July 14.

Road Construction

STATE OF NEW JERSEY
STATE HIGHWAY COMMISSION
Trenton, N. J.

Notice is hereby given that sealed bids will be received by the State Highway Commission of New Jersey for:

Construction of Route S-25, Burlington-Bristol Bridge Approach, Burlington County. Length 0.45 mile.

ESTIMATED:
3,122 cu.yds. unclassified excavation.
20,541 cu.yds. borrow.
7,500 sq.yds. 9" rein. concrete pavement.
4,614 sq.yds. gravel shoulders.
1 small span bridge.

Bids for the above will be received at the office of the State Highway Commission, State House Annex, West State Street, Trenton, New Jersey, on Monday, July 14, 1930, at eleven o'clock (11:00 a.m. EASTERN STANDARD TIME), twelve o'clock (12:00 NOON, DAYLIGHT SAVING TIME) and will be opened and read immediately thereafter.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, State House Annex, Trenton, New Jersey, and may be inspected by prospective bidders during office hours. Plans will be furnished on a deposit of Ten Dollars ($10.00) for each set of plans and specifications upon application to the State Highway Department, Room 102, State House Annex, Trenton, New Jersey. Bids must be made on the standard proposal forms in the manner designated in the 1930 standard State Highway specifications and must be enclosed in sealed special addressed envelopes bearing the name and address of the bidder and work bid upon on the outside, and must be accompanied by a certified check drawn to the order of the Treasurer of the State of New Jersey for not less than ten per cent (10%) of the amount of the bid, provided that the said certified check shall not be less than $500.00 nor more than $20,000.00 and must be delivered at the above place on or before the hour named. Copies of the standard proposal forms and special addressed envelopes will be furnished on application. Bids not enclosed in special addressed envelopes will be considered informal and will not be opened. Each bidder must also accompany his bid with a Statement of Equipment properly filled out. The right is reserved to reject any or all bids.

By order of the State Highway Commission.

A. LEE GROVER,
Chief Clerk.

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22 South Street
New York City

OFFICIAL PROPOSALS

Bids: July 17.

Construction of County Jail

Westchester Co., N. Y.

Proposals will be received for the erection and completion of a County Jail for the County of Westchester and State of New York.

Item A—For the erection and completion (exclusive of plumbing, heating, ventilating, electric, elevator and cell work).
Item B—For the plumbing work.
Item C—For the heating and ventilating work.
Item D—For the electrical work.
Item E—For the elevator work.
Item F—For the cell work.

Separate sealed bids or proposals will be received at the office of the Clerk of the Board of Supervisors, at the County Court House, White Plains, New York, until 11:00 a.m. (Daylight Saving Time), on July 17th, 1930, when the bids will be opened and publicly read.

Specifications, drawings and all information relative to the same, may be procured from Fred L. Merritt, Clerk of the Board of Supervisors, County Court House, White Plains, New York. Plans and specifications will be ready for delivery June 24th, 1930. No plans and specifications will be delivered to prospective bidders until they file a statement of work previously done by them. A financial statement must accompany each bid or proposal.

A deposit of $25.00 will be required on each set of drawings and specifications for the general work, and a deposit of $10.00 will be required for the other items to insure their safe return within ten days after awarding the contract, otherwise deposit forfeited.

Each separate bid or proposal must be accompanied by a certified check in the sum of three per cent of the amount of bid, made payable to the Treasurer of the County of Westchester, same to be forfeited to the County of Westchester as liquidated damages in the case of failure on the part of the successful bidder to enter into a contract for the execution of the work awarded to him and to furnish a satisfactory bond within five days after notice of such award.

Each successful bidder will be required to execute the contract and furnish a surety company bond in the sum equal to fifty per cent of the amount of the contract awarded to him, guaranteeing the faithful performance of the work, said contract and bond to be in the form required by the County Attorney, a copy of which form may be seen at the office of the Clerk of the Board of Supervisors.

All bidders must submit their proposal on the form of bid accompanying the drawings and specifications and in the manner indicated therein.

The Board of Supervisors reserves the right to reject any and all bids or to accept any proposal which it may deem for the best interest of the County of Westchester.

BOARD OF SUPERVISORS OF
WESTCHESTER COUNTY
By FRED L. MERRITT, Clerk.
White Plains, N. Y.
June 17th, 1930.

Bids: July 8.

Westchester County Road Construction

White Plains, N. Y., June 23, 1930.

Sealed proposals will be received by the County Engineer at the Court House, White Plains, New York, until 10 a.m. (D.S.T.), July 8, 1930, for the construction of Yonkers Avenue, County Road No. 66-2, in the City of Yonkers. Length—0.44 mile; Width 50 feet.

Principal approximate quantities: Excavation—7,000 cu.yds.; Portland Cement—5,400 bbls.; Bar Reinforcement—76,000 sq. ft.; Reinforced Concrete Pavement—3,000 cu.yds.; Curbs; Sidewalks; and Drainage Structures.

Plans, specifications, proposal sheets and all information relative to same may be procured at the office of the County Engineer upon making the required deposit of $10.00. This deposit will be refunded upon the return of the plans and specifications in good condition within thirty days of the date of receiving bids.

Certified check or draft to the amount of at least 5% of bid shall accompany proposals.

CHARLES MACDONALD,
County Engineer.

OFFICIAL PROPOSALS

Bids: July 14.

Construction of Vehicular Tunnel

New York City.

Sealed proposals for the construction of the vehicular tunnel in West 178th Street, which forms part of the New York Approach to the Hudson River Bridge between Fort Washington, New York and Fort Lee, New Jersey will be received at the office of the General Manager of the Port Authority until 11 o'clock, Daylight Saving Time, on the morning of Monday, July 14, 1930, and then publicly opened.

The tunnel will be approximately 2,000 feet in length, extending from Fort Washington Avenue to Amsterdam Avenue. It is to be a steel and concrete structure which will provide for a roadway twenty-two (22) feet wide; and is to be built by the cut and cover method. The work involves, among other things, excavation for approach to the tunnel, between Pinehurst Avenue and Fort Washington Avenue, and the reconstruction of streets, sewers, water mains and other utilities.

A more complete description of the work and full information for bidders is given in the drawings and other contract papers, which may be seen at the office of the Chief Engineer, The Port of New York Authority, 80-90 Eighth Avenue, New York City.

Complete copies of the foregoing papers will be furnished upon deposit of $25.00. The deposit will be remitted if the papers are returned in good conditions not later than thirty days after the opening of bids.

New York, June 19, 1930.
THE PORT OF NEW YORK AUTHORITY
JOHN F. GALVIN, Chairman.

Bids: July 8.

Highway Work

Richmond, Va.

Bids close July 8, 1930, Tuesday, 10 a.m., office of the Va. Dept. of Highways, Richmond, Virginia, Rt. 32 Proj. 184, 0.6 Mi. GR. & DR. Culpeper Co., 10,659 cu.yds. excav. Rt. 52 Proj. 626, Sussex Co., 4-25 ft. Steel Beam Spans, 135.9 cu.yds. class A Conc., B Conc., 155.6, Reinf. Steel 20,415, Struct. Steel 42,695. Details obtainable upon request.

U. S. Government

U. S. ENGINEER OFFICE, Detroit, Mich.—Sealed bids in duplicate will be received until 11:00 a.m. eastern standard time, July 8, 1930, for dredging Rouge River, Mich., and for hire of dredging plant to be operated in Black River at Port Huron, Mich. Further information on application. (254)

U. S. ENGINEER OFFICE, P. O. Box 72, Louisville, Ky.—Sealed bids will be received until 2:00 p.m., central standard time, July 2, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for supplying aerial photographs of that portion of the Ohio River flood plain immediately adjacent to that river from Madison, Ind., to Paducah, Ky., containing an area of approximately 983 square miles. Further information on application. (251)

WAR DEPARTMENT, Office Constructing Quartermaster Randolph Field, Texas—Sealed proposals will be received in this office until 1 p.m., July 15, 1930, and then opened for the following construction; Bachelor Officers Quarters and Mess (3 Bldgs.); Quartermaster Maintenance Building; Fire Station; 85 two story Officers Quarters, including all utilities and appurtenances thereto, at Randolph Field, Texas. The following deposits will be required for plans and specifications: Bachelor Officers Quarters and Mess, $50.00. Quartermaster Maintenance Building, $15.00. Fire Station, $15.00; Officers Quarters, $25.00. (251)

PROPOSALS FOR CONSTRUCTION OF TACTICAL SCHOOL BUILDING. Office of The Constructing Quartermaster, Maxwell Field, Montgomery, Alabama. Sealed proposals will be received here until 10:00 a.m., C.S.T., July 29, 1930, and then opened for the construction of the Air Corps Tactical School building at Maxwell Field, Alabama. Plans and specifications may be obtained from this office by deposit of $25.00. (252)

U. S. Government

OFFICE OF THE CONSTRUCTING QUARTERMASTER, Camp Devens, Massachusetts.—Sealed proposals for the construction of a Post Hospital, including Utilities incident thereto, will be received here until 10:00 a.m., Eastern Standard Time, July 2, 1930, and then publicly opened. Plans and specifications will be furnished upon deposit here of a certified check, payable to "The Treasurer of the U. S.", in amount of $25.00 (239)

U. S. ENGINEER OFFICE, Buffalo, N. Y.—Sealed bids will be received here until 2 p.m., Eastern Standard Time, July 1, 1930, and then opened, for furnishing all labor and performing all work for dredging approximately 267,000 cubic yards, place measure, material overlying ledge rock in Oswego Harbor, N. Y. Further information on application. (2410)

WAR DEPARTMENT—Office Constructing Quartermaster Randolph Field, Texas—Sealed proposals will be received in this office until 1 p.m. June 27, 1930, for the following, including appurtenances and utilities thereto: (1) One Academic Building, comprising School and Armament Building (2) One Administration Building comprising Wing Headquarters, Group Headquarters, Theatre, Photograph and Radio Building, Elevated Water Storage Reservoir (3) One Field and Air Corps Shops and Paint and Dope Storage Building (4) Two Operations and parachute Buildings. The following deposits will be required for plans and specifications—Academic Building, $25.00—Administration Building, $50.00—Field and Air Corps Shops—$50.00—Parachute and Operations Buildings, $25.00. (2310)

U. S. ENGINEER OFFICE, WILMINGTON, DEL.—Sealed bids will be received at this office until 2:00 p.m. Eastern Standard Time, July 3, 1930, for furnishing all labor and material and performing all work for dredging approximately 120,600 cu.yds. of material in the Inland Waterways from Delaware River to Chesapeake Bay, Del. & Md. (Ches. & Del. Canal). Further information on application. (237)

U. S. Government

WAR DEPARTMENT, Office of the Constructing Quartermaster, San Juan, Porto Rico.—Sealed proposals will be received at this office until 11.00 a.m. Standard Time, and in the Office of the Constructing Quartermaster, 39 Whitehall Street, New York City, until 10.00 a.m. Eastern Standard Time, on July 11, 1930, and then opened for the construction of Two (2) Single Unit Infantry Barracks, at Henry Barracks, Porto Rico. Plans and Specifications may be obtained from the Office of the Constructing Quartermaster, San Juan, Porto Rico, and the Office of the Constructing Quartermaster, 39 Whitehall Street, New York City, for a deposit of $25.00 (253)

U. S. ENGINEER OFFICE, Buffalo, N. Y.—Sealed bids will be received here until 2 p.m., Eastern Standard Time, July 1, 1930, and then opened, for furnishing all labor and performing all work for removing old superstructure from and constructing stone superstructure on 616 linear feet of breakwater at Dunkirk Harbor, N. Y. Further information on application. (2411)

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THE ABOVE RATES ARE FOR ADVERTISEMENS SET UNDISPLAYED. FOR DISPLAY RATES SEE "USED EQUIPMENT" HEADING.
COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL 10 A.M. TUESDAY FOR THURSDAY'S ISSUE. E.N.-R.

POSITIONS VACANT

CENTRIFUGAL pump designer wanted by Western machinery manufacturer. Young graduate hydraulic or mechanical engineer now employed or recently employed on designing of hydraulic machinery desired. Salary to suit. Give all details and references. P-482, Engineering News-Record, 520 North Michigan Ave., Chicago, Ill.

ENGINEERS, otherwise employed, are wanted to act as local correspondents in Eastern and Central states. This is a spare time proposition. Mutual Reports, Diehl Bldg., Mt. Clemens, Mich.

MINE engineer (single), for work in Chile, South America, to act as safety engineer. Must have had actual underground mine experience and a general knowledge of mining; experience in milling and smelting; also general knowledge electricity and railway practices, the safety policies of large corporations and the channels of information. He should be able to plan and execute safety programs and instruct foreman and laborers in safety practices and first aid. Should possess proper combination of aggressiveness and tact. Three-year contract, transportation both ways, and salary while traveling paid by company. Give complete details first letter. P-487, Engineering News-Record, Tenth Ave. at 36th St., New York.

MINING engineer engaged in operating bituminous mines, subsidiary of a large corporation, desires a transitman. College education preferred but not essential. Must be familiar with practical coal mining and be able to develop within a reasonably short time into a competent engineer and must have a working knowledge of electricity as well as mining. Do not apply unless you have the training and education necessary to develop. Location Southern West Virginia. Salary to start $1,800 per year to increase to $3,300 per year, depending on ability. P-481, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS VACANT

WANTED, engineer. Must be familiar with plans, specifications, surveys, designs for port, harbor, canal works, foreign country. P-494, Engineering News-Record, Tenth Ave. at 36th Street, New York.

STRUCTURAL steel detailers and checkers with experience in shop details. State salary and full experience. Location Bridgeport, Penna. P-444, Engineering News-Record, Tenth Ave. at 36th St., New York.

WANTED: A young graduate mining engineer with at least one year's open pit mining experience for position in Chile, South America. State age, married or single, education, experience, knowledge of Spanish. Give references and salary expected. P-455, Engineering News-Record, Tenth Ave. at 36th St., New York.

WANTED: Operator for Byres master yard gas shovel on highway work; must be first-class and be able to carry grade. Advise salary expected. P-486, Engineering News-Record, Tenth Ave. at 36th St., New York.

EMPLOYMENT SERVICE

IF YOU are qualified for position between $2,500 and $25,000 and are receptive to negotiations for new connection, your response to this announcement is invited. The undersigned provides a thoroughly organized service, established twenty years ago, to conduct confidential preliminaries, and assist the qualified man in locating the particular position he desires. Not a registration bureau. Retaining fee protected by refund provision, as stipulated in our agreement. Send name and address only for description of service. R. W. Bixby, Inc., 272 Main Street, Buffalo, New York.

EMPLOYMENT AGENCIES

WANTED: engineers, designers, draftsman on machinery and plant work. Recent engineering graduates and teachers for engineering schools. Cleveland Engineering Agency, Rose Building, Cleveland, Ohio.

24 STEEL bridge tracers, checkers, designers, $200-$250; engineering draftsmen, designers, industrial plants, $250-$350; construction and maintenance engineers, chemical and industrial plants, $300-$400; steel mill draftsmen, designers, $250-$350; engineering graduates, tracers, steel or mechanical, $150-$175. Write or wire today—sure, quick service—pay with acceptance like you buy a railroad ticket; built through 25 years' world-wide service. Interstate Co., Security Bldg., Denver, Colo.

POSITIONS WANTED

Civil Engineers

CIVIL engineer, 28, graduate; 6 years' experience; 3 years assistant engineer, city of 30,000. In complete charge of design and construction of improvements. Good draftsman, efficient field party chief. Will consider any reasonable offer from contractor, municipality or consulting engineer. Anywhere. PW-435, Engineering News-Record, Tenth Ave. at 36th Street, New York.

CIVIL engineer, 39, 20 years' experience on railroad and government work in the States and tropics. Speak Spanish. PW-441, Engineering News-Record, Tenth Ave. at 36th St., New York.

CIVIL engineer, construction superintendent, 33, ten years' experience responsible charge investigation, plans and construction, dams, power plants, bridges, highways, difficult foundations. PW-484, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

CIVIL engineer, graduate; 20 years' experience, reports, estimates, design and construction, power and industrial plants water supply, hydroelectric developments. PW-495, Engineering News-Record, Tenth Ave. at 36th St., New York.

CIVIL engineer, designer, structural steel and reinforced concrete; twenty years' experience on office buildings, hotels, apartments, schools and factory buildings; formerly with Albert Kahn, Inc., architect, Detroit. Available at once. Harry Acy, 1750 Gaulbert Ave., Louisville, Ky.

CIVIL engineer, designer, graduate, 20 years' experience structural steel and reinforced concrete, tall buildings, hotels, power houses, industrial buildings. $280 month. PW-489, Engineering News-Record, Tenth Ave. at 36th St., New York.

LICENSED civil engineer—over 20 years' experience concrete bridges and highways with engineers and contractors. Now employed, wishes change. PW-453, Engineering News-Record, Guardian Bldg., Cleveland, Ohio.

GRADUATE civil engineer, 25, married, specialized in bridge and structural work at Cornell University. Three years' experience in highway construction and design. During present employment have had complete charge of designing a steel mill building besides organization work based on actual shop practice in a steel fabrication plant. PW-378, Engineering News-Record, Tenth Ave. at 36th St., New York.

Draftsmen and Designers

ARCHITECTURAL draftsman, 18 years' experience working drawings, details; some sketches. Engineer, architect or contractor. $75. New York or New Jersey preferred. PW-447, Engineering News-Record, Tenth Ave. at 36th St., New York.

ASPHALT ENGINEER

For India. Single not over 32 years of age, must have civil engineering background, preference being given to a degree from a recognized engineering school. Applicant must have recent experience in laying all kinds of asphalt roads as well as thorough plant training and some sales experience.

P-474, Engineering News-Record
10th Ave. at 36th St., New York City.

Engineering Employment

At Exceptionally Low Rates For Members of the American Association of Engineers

A National Organization

Employers—Let us select your men—
Thus cutting your interviewing time.

8 So. Mich. Ave., Suite 805—Chicago, Ill.

Success Can Be Attained By Any Ambitious Man

OTHER WILSON COURSES:
Reinforced Concrete Engineering
Structural Drafting
Structural Steel Designing
Structural Engineering
Bridge Engineering

The road to success in the biggest and best paid engineering specialty, is open to men who have only a grammar-school education. This is made possible by our

Preparatory Course
for
Structural Engineering
(Home Study, By Mail)

Structural work employs more engineers (in the United States) than all the railways, highway commissions, municipal governments, and the national government combined. Prepare yourself for a growing—not declining—branch of engineering work.

18th YEAR

Wilson Engineering Corporation
College House Offices, Harvard Square, Cambridge, Mass.

POSITIONS WANTED

POSITION as designing engineer and checker for all types of steel and reinforced concrete structures. Experience twenty years. Location any part of world. Contract in foreign countries three years. Salary $350 per month and expenses to and from United States. PW-437, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

Bridge and Structural

STRUCTURAL engineer wants a position as chief engineer with a steel company or an architect or a builder. Employment four hours a day—in New York. PW-416, Engineering News-Record, Tenth Ave. at 36th St., New York.

STRUCTURAL engineer, experienced in all departments of steel fabricating shops. Minimum salary hundred dollars. PW-488, Engineering News-Record, Tenth Ave. at 36th St., New York.

Estimator

ESTIMATOR and building executive. Twenty years' experience. Chicago preferred. PW-485, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

Superintendents

BUILDING superintendent, 20 years' experience in all types of buildings, deep foundation work; also bridge work of all kinds. PW-154, Engineering News-Record, Tenth Ave. at 36th St., New York.

BUILDING construction superintendent. Varied experience. Thoroughly familiar with all modern methods of building construction. Expert in rushing difficult or complicated jobs to satisfactory completion. Anywhere. Technically educated. PW-466, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

BUILDING construction superintendent of wide and varied experience on all types of large building operations. References as to character and ability. Registered engineer New York and Pennsylvania. J. B. McClelland, 7912 Park Ave., Elkins Park, Pa.

CONSTRUCTION superintendent experienced with both land and floating equipment on the construction of steam and hydro electric plants, locks and dams, docks, bridges, open caisson sinking, tunnel driving and lining, open for immediate engagement. Best of references. PW-412, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

CONSTRUCTION superintendent open for position July 1. Wide experience in all types of building construction such as banks, churches, schools, office buildings, etc. Can take complete charge of any building operation from start to finish and produce results. References as to character and ability upon request. PW-424, Engineering News-Record, Tenth Ave., at 36th St., New York.

CONSTRUCTION superintendent—18 years broad building experience, supervise entire operation, resourceful, dependable, aggressive, graduate engineer, location immaterial. PW-418, Engineering News-Record, Tenth Ave. at 36th St., New York.

CONSTRUCTION superintendent, age 44, married; 24 years' experience industrial, commercial, educational, religious buildings, residences and miscellaneous structures. Available July 1st. Location optional. PW-467, Engineering News-Record, Tenth Ave. at 36th St., New York.

CONSTRUCTION superintendent, 25 years' experience, bridges, grade crossing eliminations, foundations, cofferdams, caissons, piledriving, harbor improvements, heavy shoring, underpinning, water purification and sewage disposal plants. Location immaterial. PW-491, Engineering News-Record, Tenth Ave. at 36th St., New York.

CONSTRUCTION superintendent, 18 years' experience on dams, locks, hydro-electric plants, bridges, foundation and superstructure, hotels, office buildings, slip and traveling form elevator and tank, canal and sewage plant. Wide experience, superintend all operations, resourceful, aggressive, dependable, produce results. Location States or abroad. Now available. F. R. Pinkley, Route 2, Lockport, Illinois.

DREDGING superintendent, 26 years' experience, successfully handling large contracts, such as all kinds of dredging, submarine drilling, boat and dredge building, shovel and dragline work, road building, etc. References as to character and ability upon request. PW-461, Engineering News-Record, Tenth Ave. at 36th St., New York.

SUPERINTENDENT, unlimited New York experience, aggressive, reliable, positive producer. Location immaterial. PW-464, Engineering News-Record, Tenth Ave. at 36th St., New York.

SUPERINTENDENT and engineer — available June 25, age 40, with 20 years' experience in highways, railways, industrial plants, docks, bridges. References. PW-478, Engineering News-Record, Tenth Ave. at 36th St., New York.

SUPERINTENDENT with 25 years' experience in tunnels and subways, rock cut excavations, timbering, good organizer, having just finished tunnel in the Orient. Will be available on short notice. Box 326, Oakdale, Massachusetts.

POSITIONS WANTED

Miscellaneous

COST accountant with civil engineering education. Experience includes past six years as cost accountant and accountant. Available July first. PW-433, Engineering News-Record, Tenth Ave. at 36th Street, New York.

DIVER, long years' experience on salvage, wrecking, all kinds of submarine construction. By day or contract. PW-473, Engineering News-Record, Tenth Ave. at 36th St., New York.

ENGINEER and surveyor seeks work. Full or part time. Topography, developments, highways, boundary surveys and office work. PW-436, Engineering News-Record, Tenth Ave. at 36th Street, New York.

ENGINEER-Executive, university education and 25 years' experience in construction and other engineering lines. Six years' responsible charge construction company. Thoroughly trained in investigations, reports, organization, supervision, cost accounting, estimating, equipment maintenance and repair. Activities cover excavation, pipe lines, sewers, flood protection, bank revetment, tunnels, railroads. Well rated and widely acquainted. Seeks connection where training and work will count. Can take reasonable financial interest in sound business. PW-374, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

ENGINEER with unusual knowledge of finance, statistics, and economics, desires position. Highly educated, good personality; twenty years' experience. PW-346, Engineering News-Record, Tenth Ave. at 36th St., New York.

ENGINEER, American, 39 years old, 18 years' experience, highway and street design and construction (all types of pavement), sewerage, concrete, real estate development, investigations, reports, system, also mechanical work. Good organizer. Native or foreign fields. PW-483, Engineering News-Record, Tenth Ave. at 36th St., New York.

GENERAL foreman, 18 years' experience on subways, sewers, pipe line and foundation. Go anywhere. PW-492, Engineering News-Record, Tenth Ave. at 36th St., New York.

INSPECTOR of mixing and placing of concrete, open for engagement. PW-423, Engineering News-Record, Tenth Ave. at 36th Street, New York.

SALES engineer, age 40, sales experience 12 years' — construction experience, 8 years. Available July 1st. References. PW-479, Engineering News-Record, Tenth Ave. at 36th Street, New York.

SANITATION specialist. Graduate civil engineer, Member American Society. Twenty-four years' experience. Problems handled from inception to completion. Connection desired with large municipal project or with consultant. PW-434, Engineering News-Record, Tenth Ave. at 36th St., New York.

VALUATION Order 3: Engineer with 20 years' experience, principally railroad construction and maintenance. 7 years in charge of valuation on 2 divisions of a trunk line road. PW-442, Engineering News-Record, Tenth Ave. at 36th St., New York.

SALESMEN WANTED

New York District

Manufacturer of concrete admixture wants salesman or sales manager for New York district on salary and expense account. Should be 24 to 34 years old, acquainted in the East, with several years engineering education and some sales experience. Expanding business offers opportunity for advancement to right man. SW-493, Engineering News-Record, Tenth Ave. at 36th Street, New York.

REPRESENTATIVES WANTED

Branch Manager to Represent Live Shovel and Crane Manufacturer in Chicago

One of the oldest and best-established companies in the excavating equipment industry seeks a new Chicago branch manager. Chicago is one of our strongest territories; many outstanding installations and satisfied customers are available for prospects' references. This is a big job, with great development possibilities. If you are of the right caliber and have made a real success in construction machinery selling, please write us fully, telling everything about yourself that you would want to know if you were in our place. Please don't withhold details "for a later interview," as interviews will be granted only to men who tell satisfactory things about themselves in their first letters. RW-459, Engineering News-Record, Tenth Ave. at 36th St., New York.

WANTED

SALESMEN

on liberal commission basis to market a new machine that will revolutionize drilling and countersinking of metals. Prefer men who are selling products to metal fabricators as well as large industrial firms. Address,

GUIBERT STEEL COMPANY
P. O. Box 1037, Pittsburgh, Pa.

REPRESENTATIVE WANTED

Sales Representatives, Central and Eastern States

The most economical metal door trim; also new metal stud for 2-inch partitions, only A-1 men with best reference, commission, state experience. RW-480, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

REPRESENTATIVE AVAILABLE

REPRESENTATIVE available July 1st. Sales engineer, thoroughly reliable and experienced; extensive following among contractors in Chicago and Central States territory, desires sales position with manufacturer of power shovels, or some kindred line. RA-452, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

PATENT ATTORNEYS

INVENTIONS commercialized. Patented or unpatented. Write Adam Fisher Mfg. Co., 529 Enright St., St. Louis, Mo.

DETROIT REPRESENTATIVE

Civil Engineer, executive, 20 years' experience all types building work, railroad bridges and viaducts, engineering, architecture and construction supervision and management, sales and contracting. Successful record of achievement in conducting own architectural office, also, as construction manager and chief engineer with large contracting company. Presently connected. Desire to exclusively represent high grade, well established concern, contracting or selling, where broad experience will coordinate. Wide acquaintance with local architects, contractors, manufacturers and bankers. Salary or commission arrangement. Excellent references.

RA-490, Engineering News-Record
520 No. Michigan Ave., Chicago, Ill.

New York Company handling very profitable reinforced concrete specialty in building industry requires $30,000 additional capital to expand production. Offers attractive opportunity to construction engineer and business executive

CHARLES WHITING BAKER
53 Park Place, New York

Unloading and Hauling Contracts Wanted

We relieve you of hauling and unloading problems. Yardage or tonnage rates.

CRANES AND TRUCKS FOR RENT
We go anywhere.
RIDDLE CONTRACTING CO.
1110 S. 31st St., Philadelphia, Pa.
(Jackson 1066)

FOR SALE

Machine Shop and Foundry

Convenient to New York City. Established line with excellent field for expansion. Now operating.

BO-439, Engineering News-Record
Tenth Ave. at 36th Street, New York City

ENGINEERING MATERIALS:

Vol. 1, Ferrous
By A. W. JUDGE, *Wh. Sc., A.R.C.S.*

Properties and uses of materials in building engines, automotive equipment, etc. For manufacturers, designing and constructing engineers. **$8.50**

Write for prospectus

Isaac Pitman & Sons, 2 W. 45th St., N. Y.

FOR SALE

Gravel Pit Fully Equipped

8 miles out of Detroit and ¼ mile from incorporated village. Capacity over 600 yds. a day.

FONS FLEXIBLE PIPE COUPLING CO.
Royal Oak, Mich.

TRAINED MEN GO FARTHER

SHOULDER to shoulder with industrial and business management, the International Correspondence Schools are training men for greater efficiency. Training them to do a better job *where they are*—and qualifying them for consistent promotion in the line of their employment.

Studying at night and during their spare time with this biggest of all educational institutions, one hundred and eighty thousand men are learning to be better salesmen, better mechanics, better executives—accountants—draftsmen—engineers.

Through I. C. S. instruction they are becoming worth more, to their employers and to themselves.

There is a growing appreciation of the value of employee training among far-sighted corporations. Instead of hiring skilled workers away from other firms, business management today is developing them *inside* the organization.

Personnel directors have been taking untrained men, studying their aptitudes, gauging their character, and training them for more responsible positions. The consequence invariably has been to increase efficiency and loyalty.

In line with this advance, great industrial and commercial corporations the country over have asked the International Correspondence Schools to help them select and train the right men. For these groups of employees special courses are arranged, combining the advantages of systematic shop work with chosen courses of study.

Today there are more than 2700 companies co-operating with the I. C. S. in this practical plan of vocational training. Among them are 335 railroads in the United States and Canada, and hundreds of industrial organizations, including large motor companies, steel works, electric plants, public utilities, coal and oil companies, and chain store systems. A number of these concerns have a thousand men or more enrolled for I. C. S. instruction.

Over 2100 separate lesson units make possible flexible programs of training, adaptable to the exact needs of any business. And the International Correspondence Schools' system provides a variety of teaching methods, ranging from individual home study to supervised classroom instruction in the plant.

Whether a student enrolls through his employer or on his own initiative, it is the policy of the I. C. S. wherever possible to help him choose a course along the line of his daily work—to train him on the job—*for* the job.

We have prepared a booklet, "The Business of Building Men," containing further details of employee training under the I. C. S. plan. We shall be glad to send you a copy on request.

INTERNATIONAL CORRESPONDENCE SCHOOLS

FOUNDED 1891
SCRANTON, PENNSYLVANIA

MEMBER, NATIONAL
HOME STUDY COUNCIL

USED REBUILT
SURVEYING INSTRUMENTS
SALE—RENT REPAIRING

Sale-Rent Repair-Trade-Terms
TRANSITS and LEVELS
NEW and USED
Field and office complete equipments
Instrument repairing on all makes.
Southwestern Distributing Agent for Buff & Buff Mfg. Co.
OSWALD GRINER
1108 Oak St., Kansas City, Mo

RE-BUILT
REPAIR
RENT
REAL EXPERTS

BUFF, 46 Dey St., New York

For Quick Disposal
Used Transits and Levels
Rebuilt, guaranteed, GURLEY'S and other good makes from $50 up. Act quickly. Instruments Rented or Exchanged. All makes repaired, reasonable prices
J. H. WEIL & COMPANY
1525 Cherry St., Philadelphia, Pa.
Established 35 years

TRANSITS AND LEVELS
Excellent Bargains in re-conditioned instruments. Some practically new. Can be furnished on liberal terms. Send for bargain list and terms. We do excellent repairing very reasonable
DAVID WHITE CO., Inc.
321 Court Street Milwaukee, Wis.

Notice To Advertisers!

Owing to the Holiday, July 4th, the *"Searchlight"* pages of the July 3rd issue of

ENGINEERING NEWS-RECORD

will close one day in advance of the regular schedule.

Advertisers will be cooperating with us by sending new advertisements or changes of copy early.

FINAL CLOSING TIME
Display and Undisplay Advertising
10 A. M. Monday, June 30

Proposal Advertising
10 A. M. Tuesday, July 1st.

FOR RENT

CRANES
FOR RENT
Caterpillar and Truck Cranes
JAS. S. BRADEN
30 Church St., N. Y. Tel. Cortlandt 2809

CRANES

FOR RENT
COMPLETE MACHINERY AND EQUIPMENT CO., INC.
Tel. Ironsides 8600
Webster Ave. and Hancock Street, Long Island City, N. Y.

FOR RENT
Steel Erector's Guy Derricks
Steel derricks for rent from 5 to 30-ton; wood guy derricks for rent or sale, 5 to 10-ton; 1—15-ton all steel stiff leg derrick 90-ft. boom for rent or sale.
Queens Steel Erecting Co., Inc.
153 West 72nd Street, New York City
Phone: Endicott 1548

FOR RENT
Moore Speed Cranes
40 ft., 45 ft., 55 ft., 65 ft. Boom.
OLTMER IRON WORKS
Jersey City, N. J.
Phone: Journal Square 2608

When You're in a Hurry
Wire or 'Phone
Searchlight Department
Tenth Ave. at 36th St., N. Y.
Medallion 0700, Extension 341

CRANES

FOR RENT
with skilled operators
Reasonable Rental Rates
CRANE SERVICE CO.
Cor. St. Charles & Kossuth Sts., Newark, New Jersey
Telephones Mitchell 6550-6551.

Where Have My Profits Gone?

The answer to this question is frequently found in a list of the idle equipment you have on hand—equipment you will never use again. Turn this into CASH before the junk pile claims it.

Contractors and others may now be looking for just what you have. Let the field know what you have to SELL.

You can reach thousands of prospective buyers of good used construction equipment through a "Searchlight" advertisement.

Act Immediately and Turn This Idle Equipment into Cash

For advertising rates and information address

SEARCHLIGHT DEPARTMENT, Tenth Ave. at 36th St., New York

GOVERNMENT SURPLUS

Double Deck and SINGLE Cots

Mattresses—Blankets—Tents

TARPAULINS

Just released from the Government a large quantity of 17x30 and 20x40 New 30 oz. to the square yard. Other specials in new and used covers. Write for our 1930 illustrated catalogue on cots, tents, mattresses and blankets.

Camping Supplies

GLOBE SALES & MFG. CO.
636 Broadway, New York
Telephone: Spring 7733-7732

12" Hydraulic Dredge

to be sold to highest bidder.

Absolute Auction Sale

JULY 12th, 3 P.M.
18th and Bay Avenue, Ocean City, N. J.

Dredge, wooden hull, 22x100 ft. Rebuilt 3 years ago. Equipped with Morris 12-in. Pump, 350 hp., 3 phase, 2,200 volt, 60 cycle Engine, 360 r.p.m. It is plain suction and includes pontoons, pipe, scows, towing boat and all equipment.
This machine has been used in filling land for a Real Estate Co. which work is now completed. As they have no further use for the dredge, we have been instructed to sell same on above date to highest bidder. Terms: $2,000 cash or certified check—deposit at sale. Delivery expense to be paid by the buyer.
It is seldom an opportunity of this kind presents itself. Further information can be had from:

Louis Traiman Auction Company
588-90-92 Carman Street, Camden, N. J.
Phone Camden No. 5215 and Ocean City, N. J. No. 26.

WANTED

WANTED

Asphalt Plant

Must be in A.1 condition. State make, year, Capacity, where can be inspected; also price. The above ad is for owners only, agents need not apply.

Apply W475, Eng. News-Record
10th Ave. at 36th St.
New York City

COVERS

Genuine Waterproofed Canvas

Used by all contractors. Any size, any price.

Barnett Canvas Goods & Bag Co., Inc.
Manufacturers
125 Arch St., Philadelphia, Pa.

FOR SALE OR TRADE!

PAGE WALKER DRAGLINE

60 ft. boom, 2 yd. bucket, Diesel motor. Shop No. 133, one year's service, A-1 condition. Located foot of Fayette St., Peoria, Ill. Will trade for 1 yd. caterpillar gas machine and cash, or sell on terms.
Also 1—7 cu. ft. Hayward Standard Orange Peel bucket and 2—Sullivan Dry Stopers.
ANDERSON & COMPANY, Peoria, Ill.

Gasoline Locomotives

2—24-ton Plymouth, standard gauge, Air Brakes, M.C.B. Couplers.
1—4-ton Whitcomb, 36-in. gauge.
1—American Standard Gauge with M.C.B. Couplers.

L. R. BEATTY
632 Race St., Philadelphia, Pa.

LIQUIDATION SALE

Schofield Return Tubular Boiler, 125 hp. guaranteed working pressure 125 lb., Good as new.
Ingersoll-Rand Air Compressor, single stage 14x12 in. horizontal belt driven, 528 cu.ft. capacity.
Ingersoll-Rand Air Compressor, steam driven, 631 cu.ft. capacity.
Fairbanks-Morse Diesel Engine, stationary, 150 hp. complete with Generator and Switchboard.
Allis-Chalmers Gyratory Crusher No. 8, capacity 600 tons daily, weight 115,000 lbs.
Kennedy Gyratory Crusher No. 5, operated only one year, A-1 condition.
Ten-Ton Gas Locomotive, standard gauge.
Prices and full information upon request.

Municipal Bond & Mortgage Corp.
313 Twiggs Street, Tampa, Fla.

PORTABLE COMPRESSORS

Chicago Pneumatic class P6-DGL Portable Air Compressor, 110 cu.ft. capacity, gasoline engine driven, mounted on steel wheels. Late type.
Schramm Portable Air Compressor, 60 cu.ft. capacity, gasoline engine driven, mounted on steel wheels. Late type.
Both machines in fine condition.

W. I. DENNY
618 West Lake Street Chicago, Ill.

FOR SALE

3—Holt 10-Ton Tractors.
3—Monarch 10-Ton Tractors.
Other Road Machinery.

In fair condition—can be seen in our yards.

Badger Tractor & Equipment Co.
No. 35 Twenty-fifth St., Milwaukee, Wis.

FOR SALE

1—100 hp. Deisel Engine with 10 x 12 Direct Con. Air Compressor.
2—Lakewood Subgraders.
2—5 ton Plymouth Locomotives, 24 inch Gauge.
50—Koppel Ideal Road Trucks.
1—Blaw-Knox, 5 ton, Turntable.
1—Ord Finishing Machine, 16 ft.
1—C H & E Triplex Pump.
1—210 ft. Air Compressor.
1—Type "B" Erie Crane, with one yard bucket, full caterpillar.
6—Auto Car Trucks.

For further information, call
Penn-Harris Contracting Co.
Harrisburg, Pennsylvania

WE BUY AND SELL STRUCTURAL STEEL

Angles — Beams — Channels — Plates
NEW and USED

Long Island Structural Steel Co., Inc.
400-410 Tiffany St., Bronx, N. Y.

FOR SALE OR RENT

Cletrac 100 Crawler Tractor. Russell Giant Elevating Grader. Almost new.

Write or Wire

Midwest Tractor & Equipment Company
2701 South Wabash Avenue, Chicago

WANTED

LaPlante-Choate Bulldozer for Model 60 Caterpillar Tractor.

A. STRYKER, INC.
2053 S. Broad St., Trenton, N. J.

COMPLETE ASPHALT PAVING EQUIPMENT OR ANY PART

1500 yard railroad type plant, 60-foot mass guide derrick; 1500 yard Blaw-Knox 4-batch bin. 2—27E Gas Crawler Mixer; Tandem 3-wheel rollers; Osgood ¾ steam on cats., other miscellaneous equipment, 2 Halss batch loaders. 3 Gun Ingersoll-Rand Air Compressor mounted on 2½-ton truck.

THOMAS HOGAN, Attorney
Syracuse, New York

2—**Rebuilt Model 42 Barber-Greene Loaders,** $1500.00 each.
2—**9B2 McKiernan-Terry Hammers.**
1—**50, 60, 80 hp. ASME Vertical Boilers.**
1—**4-in., 5-in., 6-in., 8-in. Centrifugal Pumps,** direct connected to 4 cylinder gasoline motors.
2—**7x10 DD; 1—7x10 3D; 1—8¼x10 DD, with or without boilers.**
1—**60, 75, 90, 108 hp. 4 cylinder Industrial gasoline motors.**
1—**10 ton Insley Steel Guy Derrick.**
1—**280 foot Archer Tower.**
2—**Rebuilt Fordson Tractors,** $200.00 each.

MERTES MACHINERY CO.
610-614 Clinton St., Milwaukee, Wis.

WANTED TO BUY

Closing Drum Attachment; boom and ¾ yard clam shell bucket suitable for converting Bucyrus-Erie steam shovel No. 9604 into crane. Give location and best cash price.

GRADY GARMS
701 Rector Building, Little Rock, Arkansas

Northwest 105 **Gas Shovel,** ¾ yd.
Universal Truckcrane, ¾ yd. bucket.
Byers Bearcat **Gas Crane,** low price.
Heltzel 9-in. **Road Forms,** 6 in. Base.
Blaw-Knox **Batcher Bins,** 120 and 82 tons.

F. MAYER
737 Monadnock Bldg., Chicago, Ill.

Someone can use the equipment you no longer need. Advertise it in the "Searchlight Section."

G-4

USED EQUIPMENT

AND NEW, OFFERED FOR RE-SALE

Space for these advertisements is sold by the advertising inch—30 inches to a page. The price per inch is based on total space used—multiply ad space by number of insertions.

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RENT OR BUY THIS EQUIPMENT

AIR COMPRESSORS

1—90-cu.ft. Ingersoll-Rand Portable Gasoline.
2—310-cu.ft. Ing.-Rand Gas Port.
2—1,050-cu.ft. Ingersoll-Rand motor driven, synchronous motor drive.
1—1367 cu.ft. Sullivan Class WJ 225-hp. G.E. Synchronous Motor.

BOILER

1—60-hp. Farquhar Locomotive Type on wheels.

CARS

20—4-yd. Koppel 36-in. ga., steel un'frame dump.

CRANES—GANTRY

2—15-ton Link-Belt Gantry Cranes, full revolv. with 90-ft. bm., mtd. on 30-ft. towers, st. oper.
1—100-ft. Boom Industrial Broad Gauge Electric Crane, with 4 cu.yd. clamshell bucket, practically brand new.

DRAGLINES

1—50B Bucyrus Steam Cat. 60-ft. boom, 1½-yd. bucket, new 1925. Wonderful condition.

DERRICKS—COMPLETE

1—5-ton Insley Steel Guy Derrick, 95-ft. mast, 85-ft. Boom, 12-ft. Bullwheel, bucket operating.
1—5-ton all steel 50-ft. boom, 42-ft. 8-in. mast, stiffiegs, fittings.
1—10-ton Shannon wooden stiffieg Derrick. Bucket operating, 50-ft. boom.
1—10-ton Terry All Steel 3-line 100-ft. boom, 45-ft. mast, 16-ft. bullwheel.

GASOLINE CRANES

1—10-ton McMyler Crawler, 40-ft. boom.
1—15-ton Link-Belt K2, 60-ft. boom.
2—15-ton Byers, 50-ft. boom.
1—40-ton Link Belt.

GASOLINE SHOVELS

1—Model 21 Marion ¾-yd. Cat. Gas. Electric.
1—No. 2 Hoar Air Tunnel, 6 cu.ft., 36-in. ga.
1—1-yd. Link-Belt Caterpillar Gas, rebuilt.

GASOLINE SHOVEL FRONTS

1—¾-yd. P.&H. Model 206, complete.
2—1 cu.yd. Link-Belt, complete.

HOISTING ENGINES

1—80 hp. Lidgerwood, 2-drum, 80 hp. A.C., 440 v., 3 ph., 60 cy. Motor, Controller and Grids.
1—75-hp. National Triple Drum, independent motor driven swingers and bank lever controls, 3 phase, 60 cy., 440 volts.
1—60-hp. National 3-drum with independent swinger, 3 ph., 60 cy., 220 v.
1—75-hp. Lidgerwood 4-cyl. Gas with Swinger.
1—65-hp. D.D. Mundy, 4-cyl. Gasoline.
1—50-hp. Lidgerwood 4-cylinder Gas with swinger.
1—10x12, 3-drun Clyde Skeleton, with Swinger.
1—8¼x10 Triple Dr. Lidgerwood, A.S.M.E. blr.
4—8¼x10 Mundy Triple Drum, boiler mounted. New 1925, with independent swinger.
1—7x10 Lidgerwood, 3-drum, swinger attached, A.S.M.E. Boiler.

KEYSTONE GRADER

1—No. 4 Cat. Gas Keystone Grader equipped with skimmer and ditcher attachment, ⅝-yd. and 9/10-yd. dippers rebuilt.

LOCOMOTIVE CRANES

1—15-ton Link-Belt D.D., 50-ft. boom, new 1923.
1—20-ton Brown Hoist DD, 50-ft. bm., new 1922.
1—25-ton Brown Hoist, 50-ft. bm., DD, new 1927.
1—75-ton Industrial Steel Erectors' Type H, 8-wheel, 95-ft. boom.

LOCOMOTIVES—GASOLINE

1—6-ton Whitcomb, 24-in. gauge, gasoline.
2—14-ton Plymouth, 36-in. gauge, gasoline.

LOCOMOTIVES—STEAM

1—11x16 American 4-wheel Std. Ga. Saddle Tank. New 1926.
2—11x16 Davenport std. ga. Saddle Tank.
5—11x16 Vulcan 36-in. ga., Sad. Tank, rebuilt.
1—20-ton Shay Geared 36-in. gauge, 175 lbs. steam pressure.

PUMPS

10—5-in. Suction, 4-in. Discharge Submersible Motor Driven Pumps, 15 HP., 3 ph., 60 cy., 220 v. Motors, capacity 435 GPM at 75-ft. head or 690 GPM free discharge. Complete and brand new.

ROLLERS

1—5-ton Good Roads, Jr., 3 wheel, gas.

STEAM and ELECTRIC SHOVELS

1—¾-yd. Marion 21 Traction Mounted Steam Shovel, High Lift.
1—Model 70 Marion RR Shovel, 3 yd. manganese dipper Cat. Tread and A.S.M.E. Boiler.
1—Model 92 Marion Cat. electric, 4-yd. dipper. Ward-Leonard control.

TRUCK CRANE

1—6-ton Universal, 24-ft. boom. New 1926. Mounted on Mack Chassis.

TRACTORS

2—Caterpillar "30."

B.M. WEISS

1324 Widener Bldg., Phone: Rittenhouse 2311 Philadelphia, Pa.

REBUILT EQUIPMENT
With "E.C.A." Guarantee—Ready for Immediate Shipment—For Sale or Rent

BINS AND BATCHERS

2—Blaw-Knox Batcher Plants with 250-ton steel bins, each with No. 56 sand inundator and No. 500 volume stone batcher and cement Weighing device.
4—Same as above with steel bottom for wood bins.
2—Blaw-Knox 117-ton All Steel Bins, one with sand and stone batchers for ¾- or 1-yd. mixer, one with stone batcher and No. 28 inundator for 1-yd. mixer.
1—Blaw-Knox 65-ton Bin with stone and sand batchers for 28-S mixer.
1—Johnson 46-yd. Bins with stone and sand batchers for 21-S and 14-S mixer.
3—Blaw-Knox 35-ton Bins No. 14 inundator and with batchers for ½ or ¾-yd. mixer.

BUCKETS

69—Clam Shell Orange Peel and Dragline Buckets, sizes 1½-yd. to ½-yd.

CABLEWAYS

1—Lidgerwood 15-ton traveling cableway main hoist, 300 HP., A.C.; moving hoists, 80 HP., A.C.; with complete electrical equipment; all necessary sheaves, blocks, carriers, etc.
1—Lidgerwood 5-ton cableway with 10x12 Lidgerwood steam hoists, with all necessary cable, blocks, sheaves, etc., for 1700-ft. span.
1—Street 5-ton cableway with necessary blocks, sheaves, cable, etc., for 1500-ft. span, with Street 10x12 or 8¼x10 steam cableway hoist.

CARS

6—Standard gauge flat cars, capacity 60,000 to 100,000, full M.C.B., all with air brakes, lengths 36 ft. to 40 ft.
16—Special Easton Std. Ga. concrete cars, one side dump, for handling 2 cu.yds. concrete.
37—Flat Cars, 4 Easton Standard Gauge platform 6-ft.x10-ft. 16 Koppel 36-in. Ga. platform 4-ft.x15-ft. 7 Easton 24-in. ga. platform 3½x5-ft.
5—Lakewood, 2-yd. capacity, 36-in. gauge, radial gate, concrete cars.
45—24-in. ga. V Shaped cars, 20 Koppel, 40 cu.ft. 25 Lakewood 18 cu.ft.

COMPRESSORS

1—Gardner, 2-stage, belt-driven compressor. Size, 15x9x10, capacity 580 cu.ft. per minute Shop No. 51068.
1—Ingersoll-Rand Duplex, single stage, size 16x14, rated 1,198 cu.ft. at 30 lbs. pressure.
15—Portable gasoline driven rated 92, 118, 210, 310 cu.ft. Ingersoll-Rand, Sullivan, Chicago, Pneumatic and Domestic.

CRANES

1—Austin Wolverine, 15-ton capacity, with 50-ft. boom on full crawlers, gasoline operated.
1—P&H Model 700, gasoline, on crawlers, with 50-ft. boom.
1—Link-Belt gasoline, Model K-1, 10-ton on full crawlers, with 50-ft. boom. Shop No. K-1024.
1—Northwest Model 104, one with 40 ft., one with 45-ft. boom, equipped with fair leads, on full crawlers. Shop No. 1061.
2—Brownhoist No. 2 gasoline cranes, mounted on full crawlers; 10-ton capacity, with 40-ft. boom; Shop Nos. 9964 and 9859.
1—Brownhoist No. 1, 7-ton capacity, with 35-ft. boom, full crawlers, gasoline.
1—Industrial Brownhoist, type C.C. gasoline, on crawlers, combination crane and shovel, ½-yd. dipper, 36-ft. boom.
1—Austin No. 5 gasoline, with 36-ft. boom, on full crawlers.
1—Byers Bear Cat on crawlers, with 30-ft. boom.
1—Byers, Model 10, steam, on half crawlers, with 30-ft. boom.
2—Type "B" Erie crane or dragline, with 40-ft. boom and ¾-yd. bucket, also with steam shovel boom and ¾-yd. dipper. Shop Nos. 3900 and 3047.

SPECIAL

CARS

82—36-in. gauge 5 yd. cap. two way Dump Cars—67 Koppel and 15 Continental.

CONVEYORS

Conveyor and equipment consisting of the following: 1—Track Hopper 10x10 ft.; 1—18 in. Apron Feeder; 1—Belt Conveyor, 18 in. wide x 50 ft. centers, with 5 hp. A.C. motor; 1—belt conveyor 18 in. wide x 200 ft. centers, with 10 hp. A.C. motor; 1—car unloader with 5 hp. A.C. motor; 1—Vertical Bucket Elevator for cement with 3 hp. A.C. motor; 1—Car Puller with 5 hp. A.C. Motor.
3—Belt Conveyors consisting of 308 troughing idlers and 100 return rollers, with drive, idler pulleys and take-ups. 1,970 ft. 36-in. Rubber Belt.
5—Automatic self-propelled Trippers.
1—Apron Conveyor, 32 in. wide, including track hopper.

INDUSTRIAL TRACK

15—Miles 36-in. gauge, 25-lb. portable Industrial Track with 7 riveted ties per 15-ft. section with slip joint tie and fish plate connections.

LOCOMOTIVES (Gas)

27—Gasoline Locomotives as follows: 4—Plymouth 14-ton, 36-in. gauge; 1—Vulcan 8-ton standard gauge; 5—Plymouth 8-ton, 36-in. gauge; 8—Whitcomb 8-ton, 36-in. gauge gear drive; 1—Plymouth 7-ton, 24-in. gauge Friction Drive; 1—Milwaukee 7-ton, 24-in. gauge; 1—Burton, 6-ton, 24-in. gauge; Friction Drive; 2—Plymouth 4-ton, 24-in. gauge, Friction Drive; 1—Whitcomb 3½-ton, 24-in. gauge; 2—Brookville Fordson 2-ton stan. gauge; 1—Brookville Fordson 2-ton, 36-in. gauge.

CRANES (Locomotive)

1—Ohio, 20-ton, standard gauge, 50-ft. boom, Shop No. 3367.
1—Ohio, 25-ton, standard gauge, 8-wheel, with 50-ft. or 60-ft. boom; Shop No. 1780.
1—Browning No. 8, 25-ton, with 50-ft. booms; 8-wheel M.C.B.; Shop No. 2143.
1—Browning No. 2, 4-wheel standard gauge, with 50-ft. boom; Shop No. 643. BARGAIN.

DERRICKS

1—Lambert 10-ton All Steel Guy Derricks, 70-ft. boom, 85-ft. mast, 14-ft. bull wheel for hook or bucket work.
1—Dobbie, 5-ton, all steel guy derrick, with 70-ft. mast and 62-ft. boom.
50—American wooden stiff leg derricks, some with 16-in. fittings, and with 80-ft. booms and 16-ft. bull wheels, some with 14-in. fittings, with 50 to 70-ft. booms, and 12-ft. bull wheels, arranged for hook work or clam shell.

HOISTS (Electric)

1—National 3-drum electric hoist, with 100 H.P., 220 or 440 volt, 60 cycle, 3 ph., A.C. motors, with independent electric swinger, with 15 HP., motor.
1—3-drum American with 50-hp., 220 volt, 60 cycle, 3 phase A.C. motor.
3—Double drum hoists with attached swingers; 2—American with 40-hp.; 1—Lidgerwood with 37-hp.; all A.C. motors.
6—National double drum electric hoists; drums 16-in. dia. x 29-in. long; 2—with 75-hp.; 2—with 60-hp., 220 volt, 60 cycle, 3 phase, A.C. motors. 2—with 50-hp., 220 volt, D.C. series wound motors.
5—Lidgerwood double drum; 3—with 60-hp. A.C. motors; 2—with 65-hp., 230 volt D.C. motors.
11—Single drum electric hoists, with A.C. motors; 1—Lambert 100-hp.; 2—American 60-hp.; 1—Lidgerwood high-speed 52-hp.; 2—Thomas 60-hp.; 1—Clyde 37-hp.; 2—Thomas Reversible with elevator sheave, 20 and 30 hp.
3—Single Drum High Speed Builders Hoists with D.C. Motors, 1—30 hp. Mead-Morrison, 1—85 hp. Mead-Morrison; 1—85 hp. Lidgerwood.

HOISTS (Gasoline)

1—O.K. 120 HP., 3 drum with 120 HP., 6 cyl. Beaver Gasoline Engine.
2—National Double Drum Hoists with attached swinger, with 77-hp. Climax gasoline engines, rated 9000 lb. line pull at 200 ft. per minute.
18—Double and single drum hoists, with 40, 30, 15 and 8 hp. gasoline engines.

HOISTS (Steam)

8—Three-drum steam hoists. At present all are equipped with boilers, but could be furnished with or without boilers. 1—9x12 National; 3—9x10 Clyde; 1—8¼x10 Clyde; 1—8¼x10 Mead-Morrison, Banked, Levers; 1—8¼x10 National; 1—7x10 Lidgerwood with attached swinging gear; 1—7x10 American.
55—Double drum and single drum steam hoists; cys. all makes and all sizes from cys. 10x12 down to 4¾x6.

LOCOMOTIVES (Steam)

2—Vulcan, 20-ton, cylinders 11x16, standard gauge, 4-wheel, saddle tank, steam brakes, Shop No. 1417 and No. 2159.
1—Baldwin 18-ton, 11x16 cyl. 36-in. ga. saddle tank, steam brakes. Shop No. 52340.

PUMPS

40—Centrifugal Pumps from 12-in. suction and discharge down to 2-in. Belt Drive and direct connected to A.C. Electric Motors.
50—Steam Force Pumps, Nye and Pulsometer, Diaphragm, Double Plunger and gasoline force pumps.

SAND PUMPS

1—12-in. Morris Belt Driven.
1—8-in. Hetherington Burner Manganese Belt connected to 200 HP. A.C. Motor.
1—6-in. Morris Belt Driven.
1—6-in. Erie Belt Driven.

SCRAPER OUTFIT (Drag)

1—2-yd. Green Drag Scraper Outfit with 120 HP. O. K. 3-drum hoist with all necessary sheaves and fittings.

SHOVELS

1—Type 37 Marion, full revolving steam shovel, on crawlers, 1¾-yd. dipper. Shop No. 5308.
2—Erie, type B, shovels, with ¾-yd. dippers and equipped with 40-ft. crane boom, ¾-yd. clamshell bucket. Shop No. 3900 and No. 3047.
1—Marion, model 21, steam Shovel, on crawlers, ¾-yd. dipper; Shop No. 4196.

SWINGING ENGINES

17—Independent steam slewing engines, 6x8, 4¾ x6 and 4x5, all makes.
11—Clyde Independent Electric Swingers with 10 or 15 HP. Motors.

Special Sale of Concrete Mixers To Reduce Inventory

2—Size 56-S Mixers, with batch hopper with or without power. 1—Smith tilter. 1—Ransome.
1—Smith 40-S Tilter, with or without electric motor.
108—Concrete Mixers, 28-S, cap. 1 yd.; 21-S, cap. ¾-yd.; 14-S, cap. ½-yd. With steam or electric power with side loaders or batch hoppers. Following makes: Marsh-Capron, Koehring, Milwaukeee, Ransome, Smith, Smith-Chicago, Rex, Lakewood, Foote or Oshkosh.
12—10-S with side loaders and water tanks and LeRoi Gasoline Engines.
46—7-S, cap. 1 bag with low charging platforms, with gasoline engines.

Write for new stock list just off the press listing our complete stock of equipment owned by us.

EQUIPMENT CORPORATION OF AMERICA

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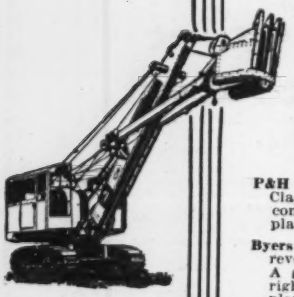
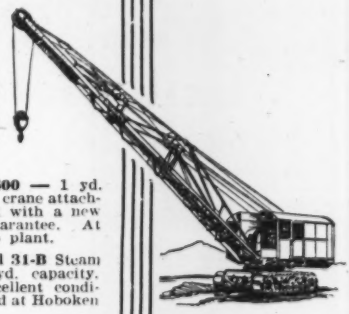
Phone: Grant 6100	Phone: Seeley 5100	Phone: Rittenhouse 6100	

A big job and a thorough one



This company has built up a large organization fully capable of doing a big job and a thorough one.

Our huge resources make it possible for us to render a real service. And in every case E. E. D. rebuilt and reconditioned equipment is satisfactory. We have branches conveniently located and skilled engineers who are always at your service. When you need equipment they will help you select that which is suitable.



P&H Model 205—½ yd. Clamshell Crane. In good condition. At Chicago plant.

Byers Bearcat — A half revolving ½ yd. Crane. A good crane — priced right. At West Allis plant.

P&H Model 300—½ yd. Shovel. Machine has been thoroughly reconditioned. Located at Chicago plant.

Kochring No. 1 Shovel—With ¾ yd. dipper; crane attachment available. In good condition—Exceptionally low priced. At Chicago plant.

P&H Model 200—¾ yd. Clamshell. Thoroughly reconditioned. Looks like new. At West Allis plant.

P&H Model 206—¾ yd. Shovel. Ready for immediate delivery. At Hoboken plant.

Northwest 104 — 1 yd. Shovel. Reconditioned. Ready to go. Hoboken plant.

P&H Model 210—1 ¼ yd. Crane. A real bargain. At Dayton, Ohio.

P&H Model 700 Dragline At Chicago plant.

Marion No. 32—1 yd. Steam Shovel on full crawlers. An exceptional buy. Located at Pittsburgh.

P&H Model 600 — 1 yd. Shovel with crane attachment. Sold with a new machine guarantee. At the Chicago plant.

Bucyrus Model 31-B Steam Shovel—1 yd. capacity. In very excellent condition. Located at Hoboken plant.

P&H Model 206-B ⅞ yd. Shovel. Practically as good as new. At West Allis plant.

Bucyrus Model 31-B 1 yd. Steam Shovel with crane attachment available. In very good operating condition. Located at Chicago plant.

Rentals with options to purchase.

ASK FOR COMPLETE LIST

We have many other machines and are taking in more from time to time. If you don't see what you need, write or wire nearest office.

RELIABLE EXCAVATING E·E·D EQUIPMENT

EXCAVATING EQUIPMENT DEALERS, INC.

EXCLUSIVELY EXCAVATING EQUIPMENT

Hoboken, N. J.
1704 Willow Ave.

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5903 Greenfield Ave.

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Chicago, Ill.
1038 W. Division St.

RELIABLE EXCAVATING E·E·D EQUIPMENT

1—**Mod. 4 Northwest Crane,** with 40-ft. Lattice Boom (used 4 mos.). Will Rent.
1—**Type B, High Lift, Cat. Erie St'm Shvl.,** ¾-yd. Dipper, No. 3257. Will rent.
1—**Model 21 Parsons Ditcher.** Will rent.
1—**7-8 Ransome Mixer.**
1—**Austin Mammoth Senior Rip Snorter Leaning Wheel Grader,** with Scarifier.
1—**Austin Giant Leaning Wheel Grader.**
1—**One-man Good Roads Grader** with Scarifier, 2-ton Caterpillar powered.
1—**60 Cat. Tractor,** with or without Bulldozer, will rent.
3—**2-ton Caterpillar Tractors.**
1—**Metalweld-Worthington** 210-ft. **portable compressor.** For rent.
2—5-ton **White Dump Trucks** with new pneumatic Balloon tires. Condition A-1.

A. STRYKER, INC.
Contractors
2053 S. Broad Street, Trenton, N. J.

Floating Pile Driver For Sale

Size of hull 22-ft.x50-ft., has 30-ft. leads and 2000 lb. drop hammer; double drum Lidgerwood Engine and power winches, in good operating condition. Now working in Raritan Bay district.

TULLER CONSTRUCTION CO.,
Red Bank, N. J.

FOR SALE

Bargain to Quick Buyer

Sixty (60) Ornamental 5-Cluster Light Standards, Union Metal Company Catalog No. 187. For information and price, address,

FRED. M. HARPER, City Engineer,
Butler, Pa.

BARGAIN 27E PAVER

Used Leach 27E Paver overhauled at the factory—offered at a very attractive price —for further particulars write to the

LEACH COMPANY
Oshkosh, Wisconsin

FOR SALE
100—50 Tons Capacity

All Steel Hopper Dump Ore Cars

In Splendid Condition
Lowest price in years.

DULUTH IRON & METAL CO.
Duluth, Minn.

FOR SALE

1—**Bucyrus Erie Gas Shovel No. 1030** Serial No. 10002. Has had less than 60 days service.

1—**Johnson 70 Ton Bin**—demountable with two sets of measuring hoppers.

Large stock of 9 inch Heltzel forms with new lock joints.

1—**18 ft. Ord Finishing Machine** in good condition.

1—**Western Elevating Grader**—36 inch crrrier in first class condition.

6—**Western Wheelers**

Duncan Construction Co.
112 So. Michigan Ave., Chicago, Ill.

SURPLUS EQUIPMENT

Fredk. L. Cranford—Chas. H. Locher Co., Inc.
1475 Broadway, New York City Phone Bryant 1705

2—Ingersoll-Rand Type PRE-2 Compressors, 1300 C.F., 3 ph., 60 cy., 220 v.
1—Chicago Pneumatic Portable Compressor, 128 C.F., 3 ph., 60 cy., 220 v.
2—Northwest Cranes, Model 105.
2—Universal Cranes, mounted on Mack Trucks.
1—Pull Shovel Attachment for Northwest Crane.
1—40-ft. Boom for Northwest Crane. Extra 10 ft. Section.
4—Marion Model 32 Air Shovels, 14 ft. booms, 10 ft. dipper handles. Cats.
1—Marion 1¼-yd. Dipper.
6—P. & H. Travellers for Overhead Cranes, 5 ton, 9 ft. gage, 3 ph., 60 cy., 220 v. Ideal, on an economically built runway, for the storage or re-handling of materials, using either hooks or grab buckets. In splendid condition.
1—Moore Trench Machine, 288 ft. span, 9 ft. wide, 19 ft. high, 16 ft. gage.
1—Stiffleg Derrick, 36 ft. mast, 65 ft. steel boom, 15 ton.
1—Stiffleg Derrick 36 ft. mast, 54 ft. boom, all steel, 10 ton.
1—Stiffleg Derrick, 27 ft. mast, 40 ft. boom, timber, 5 ton.
60—Ingersoll-Rand DCR-23 Jackhammers.
12—Ingersoll-Rand CC-35 Paving Breakers.
8—Ingersoll-Rand Clay Diggers.
2—N-72 Water Leyner Drifters.
1—R-72 Water Leyner Drifters.
1—G-10 Quarry Bar.
2—Koehring 1 yd. Heavy Duty Mixers, D.C. Current. Will install A.C. Motors.
15—Steel Skips, Union Iron Works make, 2x5x7, ⅜ in. plate.
3—Maxim Silencers (for reducing vibration on air intakes of large compressors) 12 in. connections.
2—1½ yd. Hayward Clamshells.
4—1 yd. Hayward Orangepeels.
1—3 Drum Electric Hoist, 75 hp. D.C., 230 v.
1—2 Drum Electric Hoist, 52 hp. A.C., 3 ph., 60 cy., 220 v.
1—2 Drum Electric Hoist, 80 hp. A.C., 3 ph., 60 cy., 220 v.
1—2 Drum Electric Hoist, 60 hp. A.C., 3 ph., 60 cy., 220 v.
1—2 Drum Munday Steam Hoist, 7x10 cylinders.
8—24-in. Gage Flat Cars.
12—36-in. Gage Flat Cars.
Miscellaneous "I" Beams and built up Girders.

Ready for satisfactory performance

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Furnished Subject Trial in Your Service

LOCOMOTIVES

2—Std. ga. 19x24 Porter 6-wh'l'd Switchers Shop Nos. 6153 and 6160, wt. 62½ t. on Drivers.
1—Std. ga. 17x24 Davenport 6-wheeled Switcher, Shop No. 1468, wt. 47 t. on drivers.
1—Std. ga. 16x24 Porter, 4-wh. Sd. Tank. No. 5352, Nat. B'd Boiler, wgt. 50 tons.
1—Std. ga. 14x20 Vulcan 4-wheeled Saddle Tank, Shop No. 1705, weight 37½ tons.
1—Std. ga. 11x16 Vulcan 4-wheeled Saddle Tank, Code boiler, wt. 21 tons. Shop No. 2309. Never used.
1—Std. Ga. 11x16 Davenport, wt. 21½ tons, Code Boiler, Shop No. 1939.
1—36-in. ga. 11x16 Daven., wt. 21½ tons, A.S.M.E. Nat'l Boiler, No. 2153, new.
5—11x16 Cylinder, 36 in. ga. Davenport 4-Wheeled sad. tk. Shop Nos. 1939, 2124, 2125, 2149 and 2150, wt. 21½ t. Nat. Board Boiler.
1—9x14, 36-in. ga. Porter, 4-whld. S. Tk., Code Boiler, wt. 15 t., Shop No. 6958.
1—Std. Ga., 14-ton Whitcomb, Air Brks. Shop No. 12147.
2—36-in. ga., 12-ton Whitcombs, Shop Nos. 11707 and 11789.
1—36-in. ga., 7x12 Davenport, weight, 9 tons, A.S.M.E. boiler, Shop No. 1567.

STEAM SHOVELS—Revolving

3—50-B Bucyrus, steel cats., Std. b'm. eqpd., A.S.M.E. boiler.
1—Mod. 37 Marion, st. oper., st'l cats., std. equip., 1¾-yd. dip, Cd. B.
2—20-B Bucyrus, ¾ yd. capacity steel caterpillars.
3—Type "B" Erie Full Revolving Caterpillar Shovels, High Lift Boom, ¾-yd. dipper.

SHOVEL PARTS

1—Complete Front for No. 1 Koehring.
1—Shovel Front comp. for 104 Northwest.
1—Pull-Shv'l Attach. comp. for 104 No.W.
3—Complete Shovel Attachments for K-2 Link-Belt. 1-yd. dipper.
Parts for Type B Erie. 1—1-yd. Erie Dip. Shovel boom, dipper arm and 1-yd. dipper for No. 2 Koehring.

SPECIALS

DRAGLINE

1—225 Bucyrus, st'm oper. equipped 143-ft. bm, 6-yd. Page bkt. Tk. m.t can furnish with boom to 160 ft.

LOCOMOTIVE CRANES

1—Dock Crane, bucket operating, 60-ft. boom, 7-ft. 10-in. gauge, 12-ft. wheelbase, capacity 15 tons at 18-ft. radius.
1—30-ton Industrial, 8-wheel, MCB Trucks.
1—25-t. McMyler, 8-wh., MCB trks.
2—20-ton McMyler, 8 wheel, MCB Trucks.

SIDE DUMP CARS

22—20-yd. Western Automatic.
14—20-yd. Magor all-steel Automatic Air.
1—18-yd. Western, all steel.
47—16-yd. Western, steel sills, wood bed.
49—12-yd. Western.
16—8-yd., 36-in. ga. Continental double truck, steel sill, wood beds.
4—8-yd. Std. ga. K.&J. St'l Beam, w'd b'd.
3—6-yd. K.&J. steel sills Truss-rod doors.
20—5-yd., 36-in. ga. Western, steel b'ms.
3—5-yd. 36-in. ga. Cont. W'd B'd St. Sills.
25—5-yd. 36-in. ga. Koppel, Steel Sills.
12—4-yd. K. & J. 36-in. ga. wood sills.

DRAGLINE EXCAVATORS

1—225 B Bucyrus steam (code boiler) mounting 4—4 wheel truck, 143 ft. boom, 6-yd. bucket.
1—37 Marion, stm. oper., 50-ft. bm., 2-yd. Page Bucket, Code Boiler.
3—50-B Bucyrus, steel cats., 50-ft. b'm fairlead, 1½-yd. Page Bucket.
1—Model 220 Page, 72-ft. boom, 2½-yd. Page bucket, 100 hp. Charter Oil Eng. mounted on tandem trucks.
1—Cl. 20 Bucyrus, st. op., 85 ft. b'm, 2½-yd. Page bucket.
1—Class 14 Bucyrus, 60-ft. boom, 2-yd. bucket, A.S.M.E. boiler, armored caterpillars.

SPREADER CARS

2—Std. ga. Jordan all-steel.
2—Std. ga. Western, Shop No. 605.

STEAM SHOVELS—Railroad

1—Model 80 Marion, 4-yd. Dipper.
1—60-C Bucyrus, 2½-yd. Dipper.

BUCKETS

¾ to 3½ cu.yd. cap Clamsh and Dragline.

Shovels, Cranes and Draglines—
(Gasoline)

6—¾ yd. Koehring Cranes Dragline, steel caterpillars, ¾ yd. cap.
1—Koehring Com., 1 yd. cap.
3—¾ yd. P. & H. Shovel, Crane, Dragline, st'l cats. std. shovel b'm, ¾-yd. dipper.
3—Type K-2 Link-Belt Shovel, Crane—Dragline 45-ft., 50-ft. boom, 1-yd. b'k't.
1—Model 104 Northwest Shovel., Crane, D'line, Pull Shov., 1-yd. dpr., 45-ft. boom, 1-yd. bucket.
1—Model 210 P. & H. Dragline, 40 or 50-ft. boom, 1-yd. dragline bucket, armored caterpillars.

MISCELLANEOUS

1—Worthington Type Crusher Pump, 2 stage, electric. Centrifugal, 10 in. intake, 8 in. discharge. 200 hp. motor.
6—310-ft. Chi. Pneu. Port. Compressors.
8—Type "20", 310-ft. I.-Rand Ptb. Comp.
3—Type "20", 250-ft.I.-Rand Ptb. Comp.
3—Type "20", 210-ft. I.-Rand Ptb. Comp.
1—Type "20", 90-ft. I.-Rand Ptb. Comp.
3—Best "60" Tractors Nos. 1966, 2391A. 2396A.
6—Caterpillar "60" Tractors with Bulldozer, Shop Nos. 748, 840, 2200, 6096 and 2997.
1—7-yd. Western Cat. Wagons.
1—Euclid 5-yd. Cat. Wag. (Trac. Hitch).
1—5-ton Holt Tractor with Bulldozer.
1—No. 55 Buhl Portable Air Compressor.
17—1½-yd. Western, Streich and Stroud Dump Wagons.
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1—100 FD Buhl Fordson Unit.
1—160-Y Buhl Portable Air Compressors.
25—Milburn Carbide Lights.
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3—10-t. Galion Gas R'l's, with Scar. new

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1—6 x 6 Curtis Belt Driven Compressor with 10 hp. Motor.
1—75 hp. Flory Electric Hoist.
1—No. 8 Eight Wheel Locomotive Crane.
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16—12-yd. Western, Steel Beam Dump Cars.
10—50-ton Capacity All Steel Twin Hopper Cars.

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75-ton, 20x26-in., 6-Driver Switcher, A.S.M.E.
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5—50-hp., 60-hp., 80-hp. and 100-hp. A.S.M.E.

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2—15-ton, 1300-ft. span, Lidgerwoods, complete.
1—2-ton, 900-ft. span, Lidgerwood, complete.

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2—10-ton and 12-ton McMyler and Industrial Crawlers, GASOLINE.
8—7½-ton, 10-ton, 25-ton, 27½-ton, 35-ton Brownhoist, McMyler and Industrial STEAM.

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2—2-ton Sasgens—30-ft. boom.
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2—20-ton 100-ft. boom Terry Standard Steel Stiffleg, hook and bucket work.

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8—5x6, 6x8, 7x8 Lidgerwood and American.

SPECIAL

1—2-ton, 900-ft. span. Lidgerwood Cableway, complete.

1—75 hp. S/D Lambert Electric Hoist

1—15-ton, "Industrial" Crane, Full Crawler Treads, 50-ft. boom.

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6—15-hp., 30-hp., Lidgerwood and Mead-Morrison, sgl. and dbl. drum. GASOLINE.
12—20-hp., 40-hp., 50-hp., 60-hp., 75-hp., and 100-hp., Lidgerwood and Thomas, single and double drum ELECTRIC.
14—6¾x8, 7x10, 8¼x10, 9x10, 9½x12, 12x16 Lidgerwood, Lambert, National, American and Clyde single, double and three drum, STEAM.

LOCOMOTIVES
12—24-in., 36-in., & 42-in. ga. GAS STEAM.

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31—7-S, 10-S, 14-S, 28-S, Knickerbocker, Koehring, Ransome, gasoline and electric.

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10—No. 3, No. 5, No. 6, No. 7, and No. 9B2, McKiernan-Terry.
1—No. 2 National.
4—No. 1 and No. 2 Vulcan.

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6—2-in. High Pressure Road Pumps, GAS.
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5—Nos. 5, 7 & 8 Pulsometers, STEAM.

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2—Industrial Works Crawlers—⅞-yd.—GAS.
3—Erie Type B Crawlers—STEAM.

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Drums are driven by wide faced helical cut gears mounted on S.K.F. ball bearings enclosed in case and running in oil.
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371 ft. Sullivan WG-6.
355 ft. Ingersoll ER-1.

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2588 ft. Ingersoll OC-3.
1955 ft. Ingersoll XPV-3.
1531 ft. Ingersoll XPV-3.
1166 ft. Ingersoll XPVR-3.
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3—50 HP., D.C. Lambert Double Drum Hoists with attached swingers.

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1—55-ton **American** Saddle Tank; new, 1922, A.S.M.E., 180-lb., airbrakes.
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TRUCK CRANES
1—6½-ton Universal, equip. with Christy Crawler. This outfit was purchased new April, 1928.

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1—K-2 Comb. Link-Belt Crawler Crane, 40-ft. boom and 1-yd. shovel.
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INDUSTRIAL 40-ton cap. Type "L," 110 ft. sectional boom, double drums, ASME boiler, 8 wheel MCB, outriggers, ballast and cable. Excellent condition.

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8—Buckets, Clamshell and Dragline, ¾ to 1¼ yd. capacities—like new.
Model 21 Ditcher, Parsons, had 10 days' service.

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Immediate shipment Chicago "Pads" for Model 104 and 105 up to Shop No. 1200. All sprocket gears, boom hoists, drums, shafts, brake bands, anything you might want.

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2—Browning 25-ton Type No. 8 MCB 50-ft. Boom, double power driven Drums, Steam Brake, Outriggers, new A.S.M.E. Boiler.

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Amer. Cement Tile Mfg. Co.

Condensers
Ingersoll-Rand Co.

Contractors
Ambursen Constr. Co.
Cement-Gun Constr. Co.
Gunite Construction Co.
Longyear Co., E. J.
MacArthur Conc. Pile Corp.
National Gunite Contr. Co.
Raymond Concrete Pile Co
Spencer, White & Prentis, Inc.
Terry & Tench Co., Inc.

Conveying Systems
Chain Belt Co.
Jeffrey Mfg. Co.
Moore Trench Machine Co.

Conveyors, Belt & Chain
Austin Western Road Machinery Co.
Barber-Greene Co.
Chain Belt Co.
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.

Conveyors, Bucket
Barber-Greene Co.
Chain Belt Co.
Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.

Cranes, Crawler, Gas, Electric and Diesel
American Hoist & Derrick Co.
Buckeye Trac. Ditcher Co.
Byers Machine Co.
Dayton Whirley Co.
Harnischfeger Corporation
Manitowoc Eng. Wks.
Nat'l Equip. Corp. (Koehring, Insley Div.)
Northwest Engine Co.
Ohio Power Shovel Co.
Poor, Inc., Frederic H.
Speeder Machine Corp.
Thew Shovel Co.
Universal Crane Co.

Cranes, Locomotive
(See also Cranes, Crawler)
American Hoist & Derrick Co.
Bucyrus-Erie Company
Industrial Brownhoist Corp.
Manitowoc Eng. Wks.

Cranes, Motor Truck
Buckeye Tract. Ditch. Co.
Harnischfeger Corp.
Universal Crane Co.

Cranes, Overhead
Harnischfeger Corp.

Cranes, Tractor Mounted
Poor, Inc., Frederic H.

Crawler Attachments
Haiss Mfg. Co., Geo.
Trucktor Corporation

Crawlers, Rear Type
Riddell Company, W. A.
Trucktor Corporation

Creosoted Blocks, Timber Poles, Cross-Arms, Lumber, Etc.
Carolina Wood Preserving Co.
Jennison Wright Co.
Southern Wood Preserving Co.
Wyckoff Pipe & Creo. Co.

Creosoting
American Creosote Wks.
Jennison-Wright Co.
Savannah Creosoting Co.
Wyckoff Pipe & Creo. Co.

Cribbing Units Concrete
Amer. Cement Tile Mfg. Co.

Crushers and Pulverizers
Allis-Chalmers Mfg. Co.
Galion Iron Wks. & Mfg. Co.
Jeffrey Mfg. Co.
Universal Crusher Co.

Culverts, Corrugated
Galion Iron Wks. & Mfg. Co.
Gohi Culvert Mfgrs., Inc.
Toncan Culvert Mfrs. Assn

Culverts, Metal
Amer. Rolling Mill Co.
Gohi Culvert Mfgrs., Inc.
Toncan Culvert Mfrs. Assn.
U. S. Cast Iron Pipe & Fdry. Co.

Dams
Ambursen Construction Co.

Dam Proofing
American Asphalt Grouting Co.
Dravo Contracting Co.

Dealers, Equipment
(See Searchlight Section)

Derricks and Derrick Fittings
American Hoist & Derrick Co.
American Terry Derrick Co.
Haiss Mfg. Co., Geo.
Harnischfeger Corp.
Hayward Co.

Diggers, Trench & Clay
Indep. Pneu. Tool Co.
Ingersoll-Rand Co.

Distributors, Pressure Oil
(See Road Oilers, Pressure)

Ditching Machinery
(See Excavators)

Docks and Harbor Work
Raymond Concrete Pile Co
Snare Corp., Fred'k.

Drafting Machines
Universal Drafting Machine Co.

Drafting Room Furniture and Supplies
Dietzgen Co., Eugene
Hamilton Mfg. Co.
Keuffel & Esser Co
Staedtler Inc., J. C.

Drawing Tables
(See Tables and Boards Drawing)

Dredges
Bay City Shovels, Inc.
Bucyrus-Erie Company
Hayward Co.
Morris Machine Works
Norbom Engineering Co.

Dredges, Dipper
Bucyrus-Erie Company
Harnischfeger Corp.

Drills, Air and Electric
Indep. Pneu. Tool Co.
Ingersoll-Rand Co.

Drills, Blast Hole
Gardner Denver Co.

Drills, Core
Giles Drilling Company
Ingersoll-Rand Co.
Keystone Driller Co.
Longyear Co., E. J.
McKiernan Terry Corp.
Morris Machine Works
Sprague & Henwood, Inc.
Sullivan Machinery Co.

Drills, Rock
Gardner Denver Co.
General Electric Co.
Ingersoll-Rand Co.
Schramm, Inc.
Sullivan Machinery Co.

Drums, Holding and Counterweight
Blaw-Knox Co.
Hayward Co.

Dryers
Blaw-Knox Co.
Vulcan Iron Wks. of Pa.

Elevators, Bucket
Chain Belt Co.
Haiss Mfg. Co., Geo.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lakewood Engrg. Co.

Elevators, Contractors' Material
Barber-Greene Co.
Chain Belt Co.
Dravo Equipment Co.
Nat'l Equip. Corp. (Insley, C. H. & E. Div.)

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Keep Down *the* Detour Signs . .

GENUINE OPEN HEARTH IRON
GOHI
PURE IRON - COPPER ALLOY
TRADE MARK
REG. U.S. PAT. OFF.

(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

Corrugated Culverts

Installed Between Sunup and Sundown

KEEP the roads open — lower your drainage costs. In addition to unquestioned permanence, GOHI Corrugated Culverts offer the practical advantages of easy handling and quick installation.

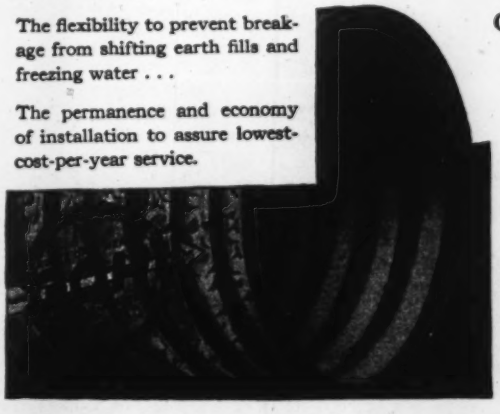
A GOHI Corrugated Culvert may be installed in less time and at lower cost than any other type of culvert. No heavy, expensive machinery needed. No delays. Simply dig the ditch, lay culvert in position, backfill and resurface — the job's done. Quick, Sure, Safe.

GOHI Corrugated Culverts are made of Genuine Open Hearth Iron, pure iron-copper alloy. Metallurgical tests and more than twenty years of actual service prove that this material offers greater resistance to corrosion than any present-day culvert metal. Get all the facts — figure all the costs — you'll specify GOHI Corrugated Culverts.

GOHI Corrugated Culverts have the strength to stand up under all traffic conditions . . .

The flexibility to prevent breakage from shifting earth fills and freezing water . . .

The permanence and economy of installation to assure lowest-cost-per-year service.



GOHI CULVERT MANUFACTURERS, Inc., Newport, Ky.

Central Culvert Co.
Ottumwa, Iowa

Denver Steel & Iron Works Co.
Denver, Colo.

A. N. Eaton, Metal Products
Omaha, Nebr.

Feenaughty Machinery Co.
Portland, Oregon

Lincoln Steel and Forge Co.
St. Louis, Mo.

The Newport Culvert Co.
Newport, Ky.

The Pennsylvania Culvert Co.
Philadelphia, Pa.

Roanoke Sales Corp.
Roanoke, Va.

St. Paul Corrugating Co.
St. Paul, Minn.

Tennison Brothers
Oklahoma City, Okla.

Tennison Brothers
Texarkana, Ark.

Capital City Culvert Co.
Madison, Wis.

Ransome Conc. Mchy. Co.
Thomas Elevator Co.

Engineers
(See also Directory of Engineers)
Longyear Co., E. J.
MacArthur Conc. Pile Corp.
Raymond Concrete Pile Co
Spencer, White & Prentis, Inc.
Terry & Tench Co., Inc.

Engineers and Draftmen's Instruments and Supplies
Beckmann Company, L.
Dietzgen Co., Eugene
Gurley, W. & L. E.
Hamilton Mfg. Co.
Kern Company
Keuffel & Esser Co.
Lufkin Rule Co.
Weber Co., F.

Engineers, Roofing
Amer. Cement Tile Mfg. Co.

Engines, Gasoline
Allis Chalmers Mfg. Co.
Ingersoll-Rand Co.
Minneapolis-Moline Power Implement Co.

Engines, High Duty Water Works
Morris Machine Works

Engines, Portable
(See Engines, Gasoline)

Excavators, Bucket
Haiss Mfg. Co., Geo.

Excavators, Cableway
National Equipment Corp. (Insley Division)
Sauerman Bros.

Excavators, Ditch & Trench
American Hoist & Derrick Co.
Barber-Greene Co.
Bay City Shovels, Inc.
Buckeye Tr. Ditcher Co.
Bucyrus-Erie Company
Byers Machine Co.
Harnischfeger Corporation
Keystone Driller Co.
Monighan Mfg. Co.
Moore Trench Mach. Co.
Nat'l Equip. Corp. (Parsons Division)
Northwest Engrg. Co.
Ohio Power Shovel Co.
Smith Mfg. Co., A. P.
Thew Shovel Co.

Excavators, Drag-Line
Bay City Shovels, Inc.
Blaw-Knox Company
Buckeye Traction Ditcher Co.
Bucyrus-Erie Company
Byers Machine Co.
Dayton Whirley Co.
General Excavator Co.
Harnischfeger Corporation
Hayward Co.
Indust'l Brownhoist Corp.
Monighan Mfg. Corp.
Nat'l Equip. Corp. (Koehring, Insley Div.)
Northwest Engrg. Co.
Ohio Power Shovel Co.
Sauerman Bros.
Thew Shovel Co.
Universal Crane Co.

Expanded Metal
Amer. Rolling Mill Co.
Ryerson & Son, Inc.

Filters, Water, Municipal & Industrial
Amer. Water Softener Co.
Roberts Filter Mfg. Co
Scaife & Sons Co., Wm. B.

Finishing Machines (Road)
(See Road Finishers, Concrete)

Floor Hardener, Concrete
(See Concrete Floor Hardener)

Flooring, Fireproof
Dravo-Doyle Company
Hendrick Mfg. Co.
Tri-Lok Company

Floor Plates, Steel
American Pressed Steel Co.
Blaw-Knox Co.
Carnegie Steel Co.

Floors, Asphalt Mastic
Standard Oil Co. of N. Y.

Floors, Wood Block
Jennison-Wright Co.
Southern Wood Preserving Co.

Flumes, Iron and Steel
Amer. Rolling Mill Co.
Blaw-Knox Co.
Gohi Culvert Mfgrs., Inc.
Heltzel Steel Form & Iron Co.

Forgings
Bethlehem Steel Co.
Carnegie Steel Co.

Form Clamps and Tighteners
Marion Malleable Ir. Wks
Universal Form Clamp Co.
Williams Concrete Equip. Co.

Forms—Culvert, Sewer, Tunnel, Etc.
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.

Forms, Curb and Gutter
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Lakewood Engrg. Co.

Forms for Walls, Building Construction, Etc.
Blaw-Knox Co.

Forms, Road
Blaw-Knox Co.
Harm Co., Geo. O.

Foundations
Longyear Co., E. J.
MacArthur Con. Pile Corp.
Raymond Concrete Pile Co.
Simplex Conc. Pile Assn.
Spencer, White & Prentis, Inc.
Underpinning & Foundation Co.

Frogs and Switches, Railway
Bethlehem Steel Co.
Ramapo Ajax Corp.

Furnaces, Annealing and Tempering
American Bridge Co.

Gates, Clam Shell
Haiss Mfg. Co., Geo.

Gates, Flood and Sluice
Hunt Co., Rodney

Gates, Hopper
Haiss Mfg. Co., Geo.

Gauges, Loss of Head
Simplex Valve & Meter Co

Gauges, Rate of Flow
Simplex Valve & Meter Co.

Gauges, Recording Pressure and Vacuum
Bristol Co.

Gauges, Water Level
Bristol Co.

Gears
De Laval Steam Turbine Co.
Earle Gear & Mach. Co.
Haiss Mfg. Co., Geo.
Link Belt Co.

Generators, Electric
Allis-Chalmers Mfg. Co.
General Electric Co.

Governors, Waterwheel
Woodward Governor Co.

Graders, Elevating
Adams Co., J. D.

Graders, Motor
Adams Co., J. D.
Galion Iron Wks. & Mfg. Co.
Riddell Co., W. A.

Graders, Tractor Drawn
Adams Co., J. D.
Blaw-Knox Co.
Galion Iron Wks. & Mfg. Co.
Riddell Company, W. A.

Graphite
Dixon Crucible Co., Joseph

Gratings, Flooring
Bates Steel Corp., Walter
Blaw-Knox Co.
Dravo-Doyle Company
Hendrick Mfg. Co.
Tri-Lok Company

Gravel-Washing Plants
Jeffrey Mfg. Co.
Sauerman Bros.

Grills
Dravo-Doyle Company
Link-Belt Co.
Tri-Lok Company

Grinders, Air and Elec.
Indep. Pneu. Tool Co.

Grouting
Amer. Asphalt Grout'g Co.
Dravo Contracting Co.

Gauge, Glass
Jenkins Bros.

Gunite Construction
Cement-Gun Co., Inc.
Cement-Gun Constr. Co.
Gunite Construction Co.
Rust Engr. Co.

Hammers, Pneumatic
(See Tools, Pneumatic)

Hammers, Steam, Pile
(See Pile Hammers, Steam)

Hangers
American Bridge Co.

Hoists, Caisson
Thomas Elevator Co.

Hoists, Contractors'—Electric
Allis-Chalmers Mfg. Co.
Amer. Hoist & Derrick Co.
Bay City Shovels, Inc.
Byers Machine Co.
Harnischfeger Corp.
McKiernan-Terry Corp. (Nat'l Hoist Eng. Div.)
Monighan Mfg. Co.
National Equipment Corp. (C. H. & E. Division)
Thomas Elevator Co.
Vulcan Iron Wks. of Pa.

Hoists, Contractors'—Gasoline
Amer. Hoist & Derrick Co.
Domestic Eng. & Pump Co.
Harnischfeger Corporation
McKiernan-Terry Corp. (Nat'l Hoist Eng. Div.)
Metalweld, Inc.
National Equipment Corp. (C. H. & E. Division)
Thomas Elevator Co.
Vulcan Iron Wks. of Pa

Hoists, Contractors' Steam
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Byers Machine Co.
Ingersoll-Rand Co.
McKiernan-Terry Corp. (Nat'l Hoist Eng. Div.)
Vulcan Iron Wks. of Pa.

Hoists, Hand
Chain Belt Co.
Harnischfeger Corp.

Hoists, Material Tower
Dravo Equipment Co.
Lakewood Engrg. Co.
Nat'l Equip. Corp. (C. H. & E. Division)
Ransome Conc. Mchy. Co.

Hoists, Pneumatic
Gardner Denver Co.
Indep. Pneu. Tool Co.
Ingersoll-Rand Co.
Sullivan Machine Co.

Hoists, Skip
Link Belt Co.

Hoppers, Concrete and Steel
(See Bins, Storage)

Hose, Air, Water and Steam
Chicago Pneumatic Tool
Gardner Denver Co.

Hydrotite
Hydraulic Developm't Co.

Instruments, Surveying
(See Transits and Levels)

Inspecting Laboratories
(See Directory of Engineers)

Inundators For Constant Concrete
(See Concrete Proportioning Equipment)

Joints, Expansion, Paving
Carey Co., Philip

Joints, Filler Paving
Standard Oil Co., of N. Y

Joints, Flexible Pipe
(See Pipe Joints)

Kilns, Rotary and Vertical
Vulcan Iron Wks. of Pa.

Ladder Steps, Steel
Blaw-Knox Company
Hendrick Mfg. Co.

Lamps, Arc and Incandescent
General Electric Co.

Lamps, Flood
General Electric Co.

Lath, Expanded Metal
(See Expanded Metal)

Lettering Guides
Keuffel & Esser Co.

Leadite,
Leadite Co. Inc.

Lead Pencils
Dixon Crucible Co., Joseph
Staedtler Inc., J. S.

Lime
National Lime Assn.

Loaders, Portable
Barber-Greene Co.

Locomotives, Compressed Air
Porter Co., H. K.

Locomotives, Electric
General Electric Co.
Jeffrey Mfg. Co.
Mancha Storage Battery Locomotive Co.
Porter Company, H. K.
Vulcan Iron Wks. of Pa.

Locomotives, Gasoline
Midwest Locomotive Wks.
Porter Company, H. K.
Vulcan Iron Wks. of Pa.
Whitcomb Company, Geo. D.

Locomotives, Steam
Koppel Indust. Car & Equip. Co.
Porter Co., H. K.
Vulcan Iron Wks. of Pa.

Locomotives, Storage Battery
General Electric Co.
Jeffrey Mfg. Co.
Mancha Storage Battery Locomotive Co.
Vulcan Iron Wks. of Pa.

Lubricants
Dixon Crucible Co., Joseph

Manometers
Simplex Valve & Meter Co

Metals, Perforated
Hendrick Mfg. Co.

Meters, Boiler Feed Water
Builders Iron Fdy.

Meters, Current
General Electric Co.
Gurley, W. & L. E.

Meters, Gas and Steam
Builders Iron Fdy.
General Electric Co.
Wallace & Tiernan Co., Inc.

Meters, Water and Oil
Builders Iron Fdy.
General Electric Co.
Neptune Meter Co.
Simplex Valve & Meter Co

Mixers, Concrete
Cement Gun Co., Inc.
Chain Belt Co.
Jaeger Machine Co.
Lakewood Engrg. Co.
Nat'l Equip. Corp. (Koehring, Smith, Kwik-Mix Div.)
Ransome Conc. Mchy. Co.
Transit Mixers, Inc.

Mixers, Grout
National Equipment Corp. (Smith Division)
Ransome Conc. Mchy. Co.
Union Iron Works

Mixers, Mortar
Chain Belt Co.
Jaeger Machine Co.
Nat'l Equip. Corp. (Kwik-Mix Division)
Ransome Conc. Mchy. Co.

Mixers, Paving
Chain Belt Co.
Nat'l Equip. Corp. (Koehring, Smith Divs.)
Ransome Conc. Mchy. Co.

Mixers, Pneumatic
Ransome Conc. Mchy. Co.

Mortar
Louisville Cement Co.
Universal Atlas Cement Co.

Motors, Electric
Allis-Chalmers Mfg. Co.
General Electric Co.

Motors, Gasoline
(See Engines, Gasoline)

Motors, Portable
Haiss Mfg. Co., Geo.

Paints, Concrete and Masonry
Amer. Sika Corp.
Truscon Laboratories

Paints, Graphite
Dixon Crucible Co., Joseph

Paints, Metal Protective
Carey Co., Philip
Dixon Crucible Co., Joseph
Inertol Co., Inc.
McEverlast, Inc.
Truscon Laboratories

Paints, Waterproofing
Amer. Sika Corp.
Inertol Co., Inc.
Sonneborn Sons, Inc., L.
Truscon Laboratories

Pavement Breakers
Gardner Denver Co.
Indep. Pneu. Tool Co.
Ingersoll-Rand Co.
Schramm, Inc.

Paving Asphalt
(See Asphalt)

Paving Blocks, Asphalt
Hastings Pavement Co.

Paving Blocks, Wood
(See Creosoted Blocks, Timber, Poles, Cross Arms, Lumber, etc.)

Paving, Brick
(See Brick)

Paving, Cold Patching
Standard Oil Co., of N. Y.

Penstocks
Blaw-Knox Co.
Chicago Bridge & Iron Wks
Naylor Pipe Co.
Pitts.-Des Moines Steel Co.
Taylor Forge & Pipe Wks.

Pile Drivers
American Hoist & Derrick Co.
Harnischfeger Corporation
Industrial Brownhoist
McKiernan Terry Corp.
National Equipment Corp. (Koehring Division)
Union Iron Works
Vulcan Iron Wks. Chicago

Pile Extractors
McKiernan Terry Corp.
Union Iron Works
Vulcan Iron Wks. Chicago

Pile Hammers, Steam and Air
McKiernan Terry Corp.
Union Iron Works
Vulcan Iron Wks., Chicago

Piles, Concrete
MacArthur Con. Pile Corp.
Raymond Concrete Pile Co
Simplex Conc. Pile Assn.
Spencer, White & Prentis, Inc.

Piles, Creosoted, Wood
American Creosoting Co.
Jennison-Wright Co.
Southern Wood Preserving

Piling, Interlocking Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Spencer, White & Prentis, Inc.

Pipe, Bends
East Jersey Pipe Co.

Pipe, Cast Iron
American Cast Iron Pipe Co.
Cast Iron Pipe Research Assn.
Donaldson Iron Co.
Fox & Co., John
Republic Steel Corp.
Warren Fdry. & Pipe Co.

Pipe, Cement-Lined
Cement Lined Pipe Co.

Pipe Coatings and Waterproofing
Carey Co., Philip
Michigan Pipe Co.
Wyckoff & Son Co., A.

Pipe, Corrugated
(See Culverts)

Pipe, Drain
Gohi Culvert Mfgrs., Inc.

Pipe Fittings
Builders Iron Fdy.
Cast Iron Pipe Research Assn.

Pipe, Iron Alloy
Naylor Pipe Co.

Pipe, Forge and Hammer Welded
Taylor Forge & Pipe Wks.

Pipe, Joint Compounds and Materials
Hydraulic Development Co
Leadite Co., Inc.
Pacific Flush Tank Co.
Presstite Engrg. Company

Pipe Joint, Flexible
Central Foundry Co.

Pipe, Lock Bar
East Jersey Pipe Co.

Pipe, Reinforced Concrete
Core Joint Concrete Pipe Co.

Pipe, Riveted Steel
Chicago Bridge & Iron Wks.
East Jersey Pipe Co.
Petroleum Iron Works Co.

Pipe, Sewer
Core Joint Concrete Pipe Co.
Gohi Culvert Mfgrs., Inc.
Laclede Christy Clay Prod. Co.
Naylor Pipe Co.
Toncan Culvert Mfrs. Assn.

Pipe Shoes
Marion Malleable Ir. Wks.

Pipe, Spiral
Abendroth & Root Mfg. Co.
Naylor Pipe Co.
Taylor Forge & Pipe Wks.

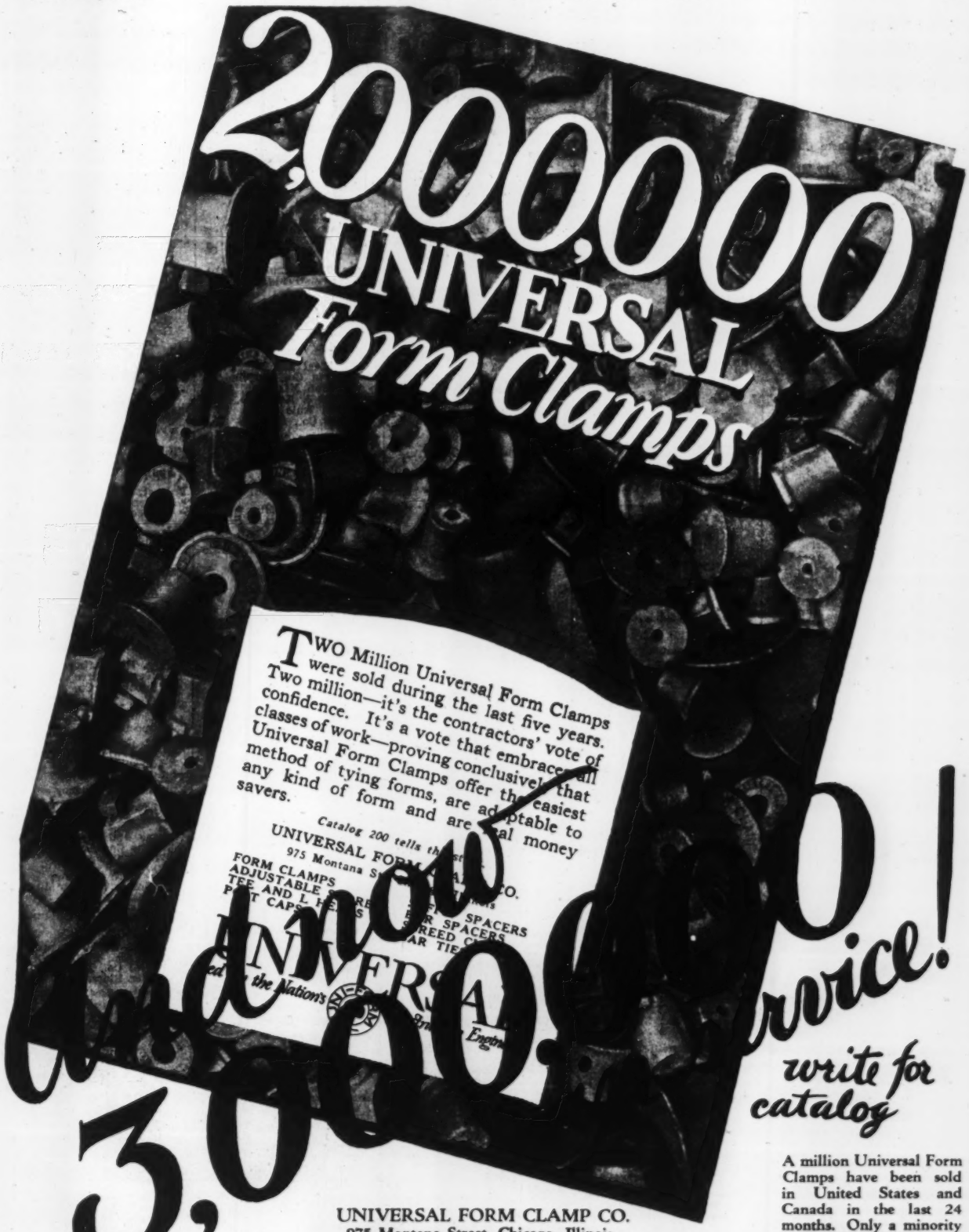
Pipe, Steel
Naylor Pipe Co.

Pipe, Wood
Michigan Pipe Co.
Wyckoff & Son Co., A.

Plates, Steel
Amer. Pressed Steel Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Poles, Steel
Blaw-Knox Co.

Power Units, Gasoline
(See Engines)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Form Clamps
TWO Million Universal Form Clamps were sold during the last five years. Two million—it's the contractors' vote of confidence. It's a vote that embraces all classes of work—proving conclusively that Universal Form Clamps offer the easiest method of tying forms, are adaptable to any kind of form and are real money savers.
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FORM CLAMPS
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TEE AND L HEADS
PLUG CAPS
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Pressed Steel Products
Blaw-Knox Co.

Pulverizers
(See Crushers)

Pumps, Air-Lift
Ingersoll-Rand Co.
Sullivan Machinery Co.

Pumps, Bilge
Yeomans Brothers Co.

Pumps, Boiler-Feed, Steam
Buffalo Steam Pump Co.
Cameron Steam Pump Works, A. S. (Ingersoll Rand Co.)
Frederick Iron & Steel Co.
Ingersoll-Rand Co. (Cameron Steam Pump Wks. A. S.)
Kingsford Fdry & Machine Works
Sullivan Machinery Co.

Pumps, Centrifugal and Multi-Stage High Lift
Allis-Chalmers Mfg. Co.
American Well Works
Buffalo Steam Pump Co.
Cameron Steam Pump Works, A. S. (Ingersoll Rand Co.)
Chain Belt Co.
De Laval Steam Turbine Co
Erie Pump & Engine Co.
Frederick Iron & Steel Co.
Gardner Denver Co.
Ingersoll-Rand Co. (Cameron Steam Pump Wks A. S.)
Keystone Driller Co.
Kingsford Fdry & Machine Works
Lawrence Pump & Engine Co.
LeCourtenay Co.
Manistee Iron Works
Morris Machine Works
Nash Engrg. Co.

Pumps, Contractors
Cameron Steam Pump Works, A. S. (Ingersoll Rand Co.)
Chain Belt Co.
Domestic Eng. & Pump Co.
Gardner Denver Co.
Ingersoll-Rand Co. (Cameron Steam Pump Wks A. S.)
Lawrence Pump & Engine Co.
Nash Engineering Co.
Nat'l Equip. Corp. (C. H. & E. Division)
Novo Engine Co.
Pulsometer Steam Pump Co.

Pumps, Deep Well
American Well Works
Lecourtenay Co.
Manistee Iron Works

Pumps, Dredging and Sand
Chain Belt Co.
Domestic Eng. & Pump Co.
Morris Machine Works
Norbom Engineering Co.

Pumps, Power
Domestic Eng. & Pump Co.

Pumps, Sewage
Buffalo Steam Pump Co.
Kingsford Fdry & Machine Works
Lawrence Pump & Engine Co.
Nash Engineering Co.
National Equipment Corp. (C. H. & E. Division)
Yeomans Brothers Co.

Rail and Rail Joints, Fastening and Specialties
Bethlehem Steel Co.
Carnegie Steel Co.

Rails, Relaying
(See Searchlight)

Railroad Ditchers
Amer. Hoist & Derrick Co.
Bucyrus-Erie Company
Harnischfeger Corporation

Recorders, Water Stage
Gurley, W. & L. E.

Refractories
Laclede Christy Clay Prod. Co.

Reinforcing, Bar Coupling
Marion Malleable Ir. Wks.
Universal Form Clamp Co.

Reinforcing, Concrete
(See Concrete Reinforcement)

Reinforcing Metal for Concrete Work
Heltzel Steel Form & Iron Co.
Nat'l Steel Fabric Co.
New Departure Mfg. Co.
Ryerson & Son, Inc.

Rivet Heaters, Electric
Amer. Hoist & Derrick Co.

Riveting Hammers
Independent Pneu. Tool Co.
Ingersoll-Rand Co.

Riveting Machines
Independent Pneu. Tool Co.

Road Finishers, Concrete
Blaw-Knox Co.
Lakewood Engrg. Co

Road Oils and Preservatives
Barber Asphalt Company
Standard Oil Co. of N. Y

Road Rollers, Gasoline and Steam
Buffalo-Springfield Roller
Galion Iron Wks. & Mfg. Co.
Huber Mfg. Company

Rolls, Crushing
Allis-Chalmers Mfg. Co.

Roofing, Prepared
Carey Co., Philip

Roofing, Steel
Blaw-Knox Co.
Ryerson & Son, Joseph T

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Byers Machine Co.
Harnischfeger Corp.
Industrial Brownhoist Co.
Keystone Driller Co.
Marion Steam Shovel Co.
National Equipment Corp. (Koehring, Insley Div.)
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Thew Shovel Company

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Industrial Brownhoist Co.
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TWO-NINETY-FIVE MADISON AVENUE · NEW YORK CITY

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This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Engineering News-Record* assumes no responsibility for errors or omissions.

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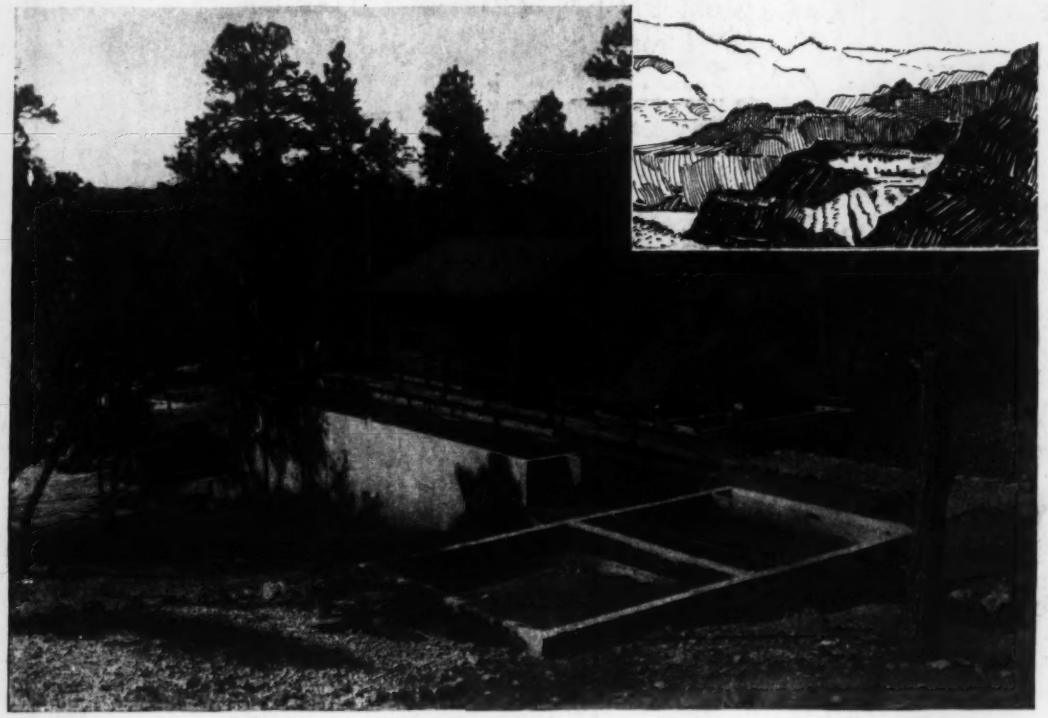

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